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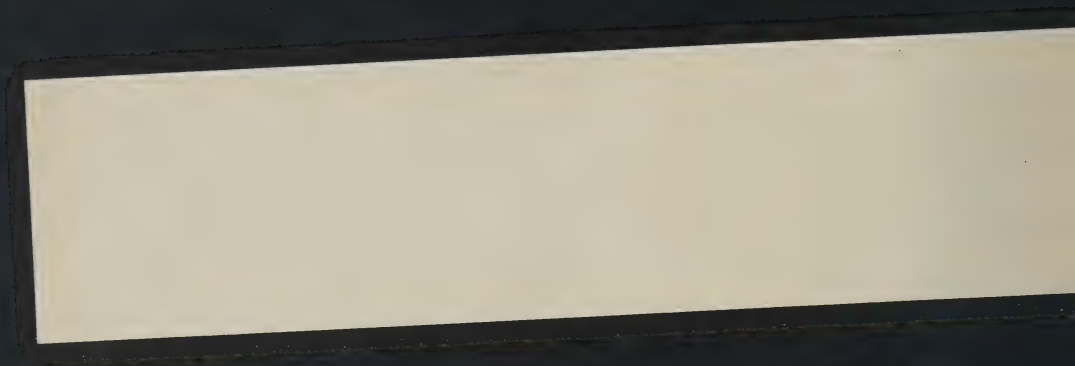
ARGENTINE-CHILIAN BOUNDARY





*NOTE : This (the Third) Part contains—*

CHAPTERS XIX. TO XXVI.





Argentine-Chilian Boundary



# REPORT

PRESENTED TO THE TRIBUNAL APPOINTED BY HER BRITANNIC  
MAJESTY'S GOVERNMENT "TO CONSIDER AND REPORT UPON  
THE DIFFERENCES WHICH HAVE ARISEN WITH  
REGARD TO THE FRONTIER BETWEEN THE  
ARGENTINE AND CHILIAN REPUBLICS"

TO

JUSTIFY THE ARGENTINE CLAIMS FOR THE BOUNDARY  
IN THE SUMMIT OF THE CORDILLERA DE  
LOS ANDES, ACCORDING TO THE  
TREATIES OF 1881 & 1893

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*Printed in compliance with the request of the Tribunal,  
dated December 21, 1899*

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## CHAPTER XIX.

- Summary*—1. DIFFERENCES BETWEEN THE EXPERTS ON THE REGION IN THE VICINITY OF LAKE LACAR.
2. GENERAL CONFIGURATION OF THE REGION.
3. EXPLORATIONS OF CHILIAN ORIGIN WHICH CORROBORATE THE RESULTS OF THE ARGENTINE SURVEYS.
4. CUTTING OF THE RIVER HUAHUM BY THE BOUNDARY LINE.
5. ARGENTINE OCCUPATION OF THE VALLEY LACAR.

### 1. DIFFERENCES BETWEEN THE EXPERTS ON THE REGION IN THE VICINITY OF LAKE LACAR.

In the Record of September 3, 1898, the Argentine Expert said :—

“Up to this point the divisional line, from Mount Santa Maria has followed the line between the slopes of the principal chain or main range of the Andes, without cutting rivers, but at the foot of Mount Perihueico flows the river Huahum, which drains the lakes Lacar and Nontué lying *east of the main range of the Cordillera de los Andes*, and, therefore, the divisional line shall cut the river Huahum, in conformity with the provisions of the 1st Article of the Protocol of May 1, 1893.

“The divisional line shall cut the river at the confluence of the Mahihuen stream (No. 267), 630 metres (2067 feet), shall follow this stream up to the summit of the centre marked 1800 metres (5906 feet) (No. 268) in the Argentine map, then through the one marked 2100 metres (6890 feet) (No. 269), and afterwards shall pass through the Gorge of Ipela (No. 270) 1490 metres (4626 feet) along the mounts marked 1920 metres (6299 feet) (No. 271), 2260 metres (7415 feet) (No. 272), 1990 metres (6529 feet) (No. 273), 2100 metres (6890 feet) (No. 274), and 2150 metres (7054 feet) (No. 275).”

The Chilean Expert has proposed for the same section the following points :—

“Pass Quetru, Mount Paimun, Pass Carirriño, Ridge Huahum, Pass Alliquina, Pass Maipu, Pass Chapelco, Range Chapelco, Pass Pilpil and Mount Queñi, marked with numbers 254 to 263, and which separate the hydrographic basin of the river Valdivia from the basin of the Argentine Limay river.”

This is the second of the important differences of opinion between the



Experts in the tracing of the boundary line, and they refer to a region where forts for the defence of the country are eventually to be erected, and where the custom and police stations will be permanently established. It is, then, a case for strictly applying the Protocol of 1893. The Cordillera de los Andes is there cut through by the waters coming from Lake Lacar and its outlet, and, therefore, part of the river Huahum, and the whole of Lake Lacar are in the territory of the Argentine Republic, as they are geographically situated to the east of the *main chain of the Andes*: to the Argentine Republic pertains the dominion and sovereignty which she had always exercised, not only before 1893, but before the Treaty of 1881.

The boundary line proposed by the Chilean Expert between Pass Carirriño and Mount Queñi possesses absolutely none of the qualities required for a good and efficient frontier, besides being, as has been said, contrary to the international agreements. The so-called *Passes* of Maipu and Chapelco have not the slightest resemblance to the passes or gaps of mountains, where the landmarks should be planted in compliance with the directions contained in the Protocol of 1893, and in the Instructions of 1894, while the pretended "Pass Pilpil" is a wide way of communication between the Argentine Settlement San Martin de los Andes and the Argentine valley of Metiquina. None of these so-called *Passes* is a frontier barrier.

The Chilean Representative has devoted a paragraph of his statement to explain, in harmony with his views, the divergence relating to the region which he calls "the hydrographical basin of Lake Lacar." As if it were a decisive argument in support of his claims, he says :

"This lake, situated on the Cordillera, at the height of 720 metres (2362 feet), receives its waters from the streams which flow down the hills that surround it, and forms the origin of the Chilean river Calle-Calle or Valdivia, which flows to the Pacific."

It is true that the waters of the lake and the valley now flow towards the Pacific, but it is also true, that the lake scientifically belongs to the *eastern slope of the Cordillera de los Andes*, and that the valley is situated *outside this Cordillera*, so that it is not possible to carry the frontier line to the east of it. The Representative of Chile adds :—

"Señor Claudio Gay, who visited those places in 1836, placed it on his map within Chilean territory."

This affirmation is the outcome of an error. Señor Claudio Gay never crossed

the *Cordillera* nor even penetrated into its western slope in these latitudes : had he done so his maps would not contain the errors they do in that region. The Chilian Representative's statement is also erroneous in the following sentence :—

“ The Argentine geographer, or geographers, who made these studies by direction of the Government—Dr. Martin Moussy and Dr. Brackebusch,—also considered it (the valley of Lacar) as Chilian, and so represented it on their maps, the former in 1860 and the latter in 1892.”

Neither Dr. Martin de Moussy nor Dr. Brackebusch ever went to the south of the city of Mendoza, situated about 800 kilometres (497 statute miles) to the north of Lake Lacar ; and if they depicted Lake Lacar in Chile, it was because they incorrectly thought that the *Cordillera* is to the east of it, as they considered that the dividing line should run along its crest, and on their maps they have so represented the boundary.

The Representative of Chile also says :—

“ But to the west of Lake Lacar a spur of the *Cordillera*, with heights of over 2000 metres (6562 feet) runs, which is known by the name of Ipela Range. The Argentine Expert giving a capricious interpretation to the Protocol of 1893, claims to make the boundary line pass over that range, which, although connected on the south to the water-parting range, is cut off in the north by the valley formed by the river which flows from Lake Lacar. Thus, in consequence, the boundary line proposed by the Argentine Expert in these places would at one part pass over a stretch of land of the heights which have been mentioned, and would descend in another, into the valley only 500 (1640 feet), or 600 metres (1969 feet) above the level of the sea, in order to join the ranges situated to the north.

“ In the meantime, the line proposed by the Chilian Expert is the water-divide in those places, which the Protocol of 1893 has expressly declared to be the ‘geographical condition of the demarcation.’ Following invariably the ranges which divide the waters, this line passes to the east of Lake Lacar, leaving the latter in Chilian territory, as had been done by the geographers above quoted, and runs over the heights of 1031 metres (3383 feet), 897 metres (2943 feet), 930 metres (3051 feet), 2500 metres (8202 feet), 1130 metres (3707 feet), and of 1700 metres (5578 feet).

“ It might perhaps be alleged that the valley of Lacar forms a sort of *cul de sac* which penetrates into the *Cordillera* towards the east. This is a result of the irregular structure of the mountain, where the crest forms a curved or broken line which is constantly changing, not only in height, but also in azimuth.

“ The frontier line between Chile and the Argentine Republic, both the sections already approved, and that which has been submitted to arbitration, presents in its development, numerous features of a more or less pronounced character, such as that which occurs in the valley of Lake Lacar. Further south, in parallel 45°, an analogous case occurs, where by the existence of lakes in the interior of the *Cordillera*, the water-parting

line deviates, not to the east, as in the case of Lake Lacar, but to the side of Chile. There, though, as all along the frontier, the water-divide as the 'geographical condition of the demarcation,' must serve as guide, because it is the 'invariable rule' of that work."

The line proposed by the Argentine Expert is the line determined in the Treaties of 1881 and 1893. It passes over the summit of the main chain of the *Cordillera de los Andes*, which divides the waters, whilst the line of the Chilean Expert passes along the plain of Quilquihue, to the east of the lower hills of the Cordillera, altogether outside it. Even Chapelco situated to the south, *does not belong to the Cordillera de los Andes*; the valley of Lacar does not penetrate into the Cordillera towards the east; the "Ipela Range" is not "a spur": it is the main chain of the Cordillera, running from north to south; there is no Cordillera or ridge towards the east of the valley, and, therefore, the so-called "cul de sac" does not exist, nor does that "range which divides the waters," along which the Chilean line is said to be traced. Both the valley and the Lake Lacar belong to the same series of transversal depressions lying to the eastern side of the Cordillera, to which also belong, as stated by Dr. Steffen of the Chilean Boundary Commission, Lakes Aluminé, Huechu-Lafquen, Lolog, Trafal and Nahuel-Huapi, to which may be added Lakes Quillen, Hermoso, Metiquina, Villarica, Falkner, Filohuehuen, Espejo and Correntoso.

The case which occurs in parallel 45° S. lat. is not analogous to that of Lake Lacar. In Lake Lacar there is no Cordillera to the east of it, but merely plains through which the boundary line cannot be marked out, while in parallel 45° S. lat., i.e. in Lake La Plata, there are to the west the snow-capped mountains which form the main chain of the Andes, along which the boundary line must necessarily be marked out. Figs. 1 and 2 of Plate LI. will show to the Tribunal the differences between the two cases. As will be observed, the only analogy consists in both being Argentine lakes situated in the eastern slope of the *Cordillera de los Andes*.

## 2. GENERAL CONFIGURATION OF THE REGION.

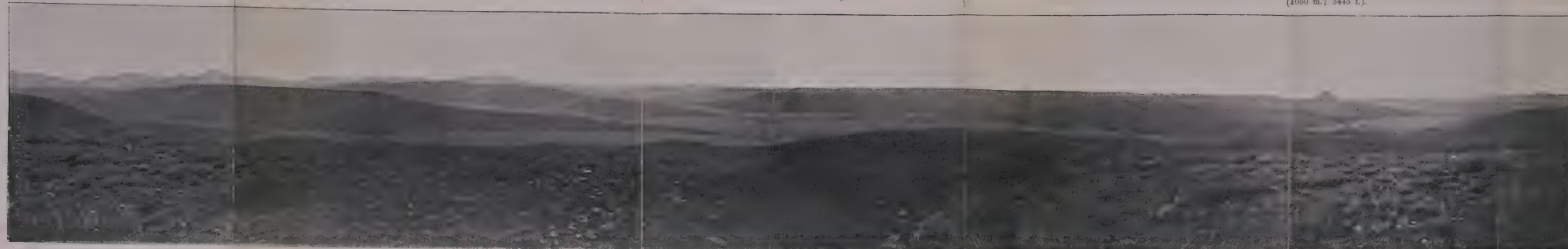
The zone in the vicinity of Lake Lacar has been the object of minute investigations by the Argentine Boundary Commission and by the staff of the Museum of La Plata, and they leave no room for doubting that Lake Lacar is situated to the east of the main chain of the *Cordillera de los Andes*.

The valley called Chimehuin, first described by Dr. Siemiradzky, was



*Cerro del Perro*  
(1050 m.; 3445 f.).

FIG. 1.



*Hills to the South of River Curru.*

*Fluvio-glacial Terrace*  
(800 m.; 2625 f.).

*River Quilquies.*

*Moraines.*

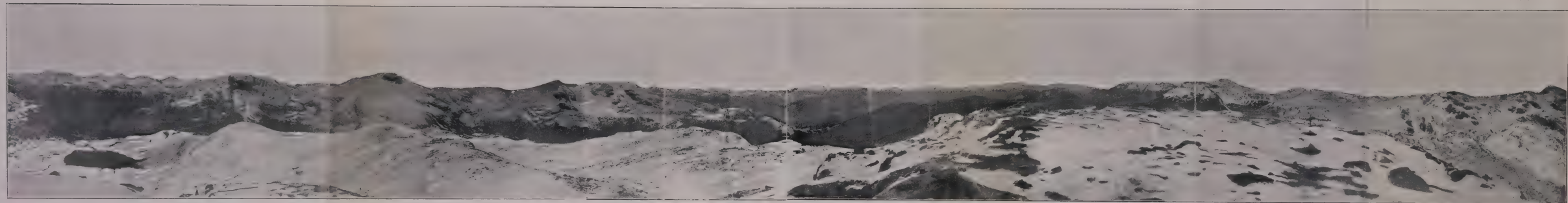
*Fluvio-glacial Terrace*  
(780 m.; 2559 f.).

*River Chuchuin.*

*Patagonian Tableland*  
(850 m.; 2789 f.).

VIEW OF SOME REGIONS TO THE EAST OF LAKE LACAR.

FIG. 2.



S.W.

PANORAMA OF THE CORDILLERA DE LOS ANDES FROM A HILL TO THE NORTH OF THE WESTERN PART OF LAKE LA PLATA  
(Heights between 1700 and 2200 m.; 5578 and 7218 f.).

*Source of an affluent of River Frías.*

[Face p. 658.]



evidently occupied in pre-glacial times by a great lake, the chief remains of which are the three lakes Huechu-Lafquen, Lolog, and Lacar. Lake Huechu-Lafquen is bounded on the north by the volcano Lanin, and on the west by the mountains *of the main Cordillera*. At its western end it divides into two arms; the northern arm forms Lake Paimun, and the southern, Lake Epulafquen which is separated from the principal lake by an alluvial cone. The gap of Carirriño is situated in a depression of the edge *of the main chain of the Cordillera*, and in such a manner that it commands the old bank of the great lake.

Lake Huechu-Lafquen stands 890 metres (2920 feet) above the sea-level, and 110 metres (361 feet) above the town of Junin de los Andes, being separated from Lake Lolog by an eastern spur of the main chain. The highest points of the main chain, in that district, measure 2100 metres (6890 feet), 2150 metres (7054 feet), and 2170 metres (7120 feet), and *over it passes the boundary-line proposed by the Argentine Expert*.

Between Lake Lolog and Lake Lacar there are summits, like Quilanlahue, of 1660 metres (5446 feet), and others without name of 1930 metres (6332 feet), 1850 metres (6070 feet), and 1800 metres (5906 feet). To the west of this region and due south of Carirriño Gap, commanding the waters which run to Lake Lolog in Argentina and those flowing to Lake Perihueico in Chile, there rises Mount Perihueico of 1740 metres (5709 feet). *This summit has also been considered by the Argentine Expert as a point of the boundary line*, that descends from it until it meets the stream of Mahihuen, which flows down to the Huahum river in an opposite direction, from the ridge there called "Cordillera de Ipela." At this point the line crosses the river Huahum—the outlet of Lake Lacar—at one of its narrow parts. It is impossible, when at this spot, to fail to recognise that it is there that *the axis of the main Cordillera exists*. Señor Fischer has described the "Pass" of Ipela as situated "among high and rugged hills," the descent of which is an extraordinary declivity, at a height of 1410 metres (4626 feet), overlooked by peaks of 2100 metres (6890 feet), and 2260 metres (7415 feet). The erosions have partly worn away this axis and pierced it, forming thus the narrow defile of the river Huahum. *This defile has been selected by the Argentine Expert as the natural and proper place where the boundary line should be carried across*. To the west of the range is found Lake Perihueico, the land near which is unsuitable for farms, being surrounded by high mountains and impenetrable forests and marshes, far from any inhabited centre of import-



ance and, owing to the nature of the soil, unfit for colonisation ; and to the east there spreads out Lake Lacar, also bounded by almost perpendicular mountains to the north and south, but to the east and south-east of which are the valleys of Quilquihue, San Martin de los Andes, Maipu or Chapelco and Pilpil.

Plates LII., LIII., LIV. and LV. give an accurate idea of the orography of that part of the Cordillera, which while not containing between volcano Lanin and Ipela Ridge long compact ridges, presents, nevertheless, a mass of mountains in which it is easy to determine the main line, the one chosen by the Argentine Expert to locate the boundary. Plate LII.—a photograph taken from the top of Mount Perihueico—shows the ridge south of volcano Lanin, the Gap of Carirriño, and the one which separates the sources which feed Lake Lolog, from those which feed Lake Perihueico. To the west culminates volcano Choshueuco, which is preceded by the ridge of Ipela. This ridge to the south of the lake, commences in Mount Huera-Hueye followed by Mount Panquehue. Plate LIII. represents the panorama seen from the eastern slope of Mount Acol, 1960 metres (6431 feet), and clearly shows the mountains of the eastern slope of the Cordillera, the ridges of which, south of Perihueico, form the traditional barrier. Plate LIV. shows the gorge of river Huahum and the ridges of Mounts Mahihuen and Acol, which precede the ridge of Ipela ; between Mounts Perihueico and Mahihuen, the Argentine boundary line crosses (Argentine landmark No. 267). Both figures of Plate LV. represent the abrupt ridge of Ipela (Argentine landmarks 270, 271 and 272), forming the summit of the main chain of the Cordillera, which has always been considered as the wall of separation between Argentine and Chilian dominions.

Comment is unnecessary, as these photographs speak for themselves.

Nothing indicates that the region of the eastern slope belongs to the basin of the river Valdivia, which flows into the Pacific. To the west of that region there tower up the snow-capped mountains, which form at the same time the true watershed of the Cordillera ; and to the east of it are seen the characteristic Patagonian plateaux ; Doctor Steffen is right, therefore, in saying that Lake Lacar belongs to the series of the eastern lakes Aluminé, Heuchulafquen, Lolog, Traful and Nahuel-Huapi.

It seems that not long since Lake Lacar drained towards the east and north-east through three rivers, now so many depressions, presenting unmistakable evidence of having been the former beds of those rivers, which have entirely

*Mount Chachenco*  
(2370 m. ; 7797 f.)

*Mount Panguitch*  
(2000 m. ; 6562 f.)

*Lake Perihueico*  
(380 m. ; 1263 f.)

*Volcano Lani*  
(3774 m. ; 12,383 f.)



CORDILLERA DE LOS ANDES, FROM MOUNT PERIHUEICO.

[Face p. 010.]

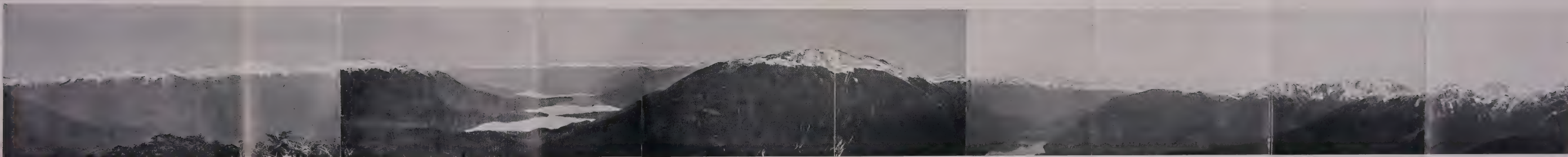






*Mount Acol.*

*Mountains between River Huachun and Lake Lolog.*



*Mount at Lake Lacar.*

*Mount Quesi.*  
(1940 m.; 6365 f.)

*Lake Quesi.*

*Ridge of Yela.*  
(2260 m.; 7415 f.)

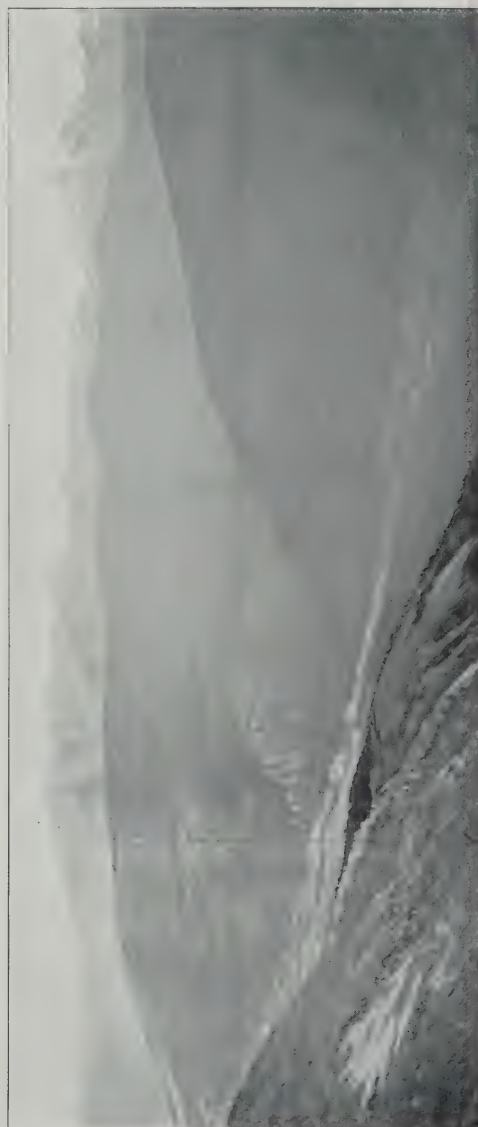
*Face p. 630*

CORDILERA DE LOS ANDES.

Panorama from the eastern slope of Mount Acol (1960 m.; 6431 f.).



*Mount Acol*  
(1960 m. : 6431 f.)

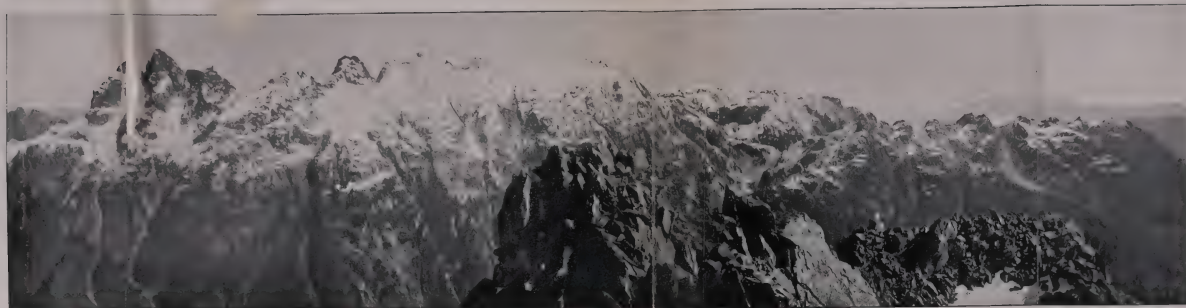


GORGE OF RIVER HUAHUM, RIDGES OF MOUNTS MAHHUEN AND ACOL, AND RIDGE OF IPELA,  
FROM THE EAST.





FIG. 1.



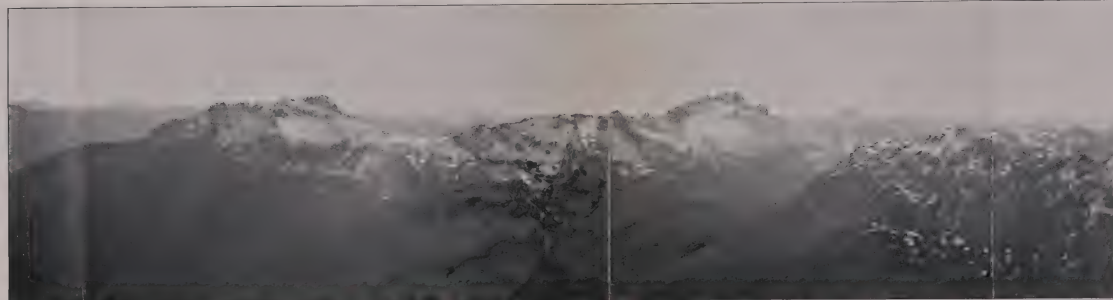
*Gap of Ipela*

MAIN CHAIN OF THE CORDILLERA DE LOS ANDES (RIDGE OF IPELA), FROM THE EAST (2260 m.; 7415 f.).

*Gap of Ipela*  
(1410 m.; 4626 f.)

*Mount Panguehue*  
(3000 m.; 9842 f.)

FIG. 2.



MAIN CHAIN OF THE CORDILLERA DE LOS ANDES (RIDGE OF IPELA), FROM THE EAST.



disappeared. As the erosion advanced to the west by the present defile of the Huahum, the lake lost its ancient outlet, and, on its level falling, valleys were formed to the east, perhaps that of the Maipu first, and then that of San Martin de los Andes. This second valley will probably soon be followed by a third, for the waters of the lake continue to diminish. The steps of retrograde erosion seen to the east of the present lake are an evident proof of its former and natural emptying. Dr. Wehrli, geologist to the Museum of La Plata, who in 1898 examined that region, observed six of these steps, perfectly preserved, and four different levels on the river Huahum. The steps are all inclined towards the east, that is to say, in an opposite direction to that followed by the now existing outlet. These retrograde terraces show that the region situated to the west of Lake Lacar, but to the east of the Ipela ridge on the main chain, belonged to the hydrographical dominion of the lake, and that only in very recent times a river running westward has occupied this region by erosion, and has become an outlet of the lake, carrying its waters to the Pacific. The erosive force of the river has increased with the volume of water, and the original small stream has gradually hollowed out a deep gorge across the ridge. Dr. Steffen is of the same opinion as Dr. Wehrli concerning the physical history of the Lacar basin.

The present valley of Quillayhue formerly belonged to the Lake Lacar basin. Its height is 824 metres (2703 feet) above the level of the sea, and it is bordered by a ridge of 1000 metres (3281 feet) high, which is cut by a stream, running slowly in the valley and then falling in cascades into Lake Lacar. This stream crosses the dry lake bed, entering it through a gorge, which in its end attains 1060 metres (3478 feet), and which separates this lost lake from the dried-up bed of a second lake, 1020 metres (3347 feet), which emptied itself in the direction of Lake Lolog (Plate LVI.)

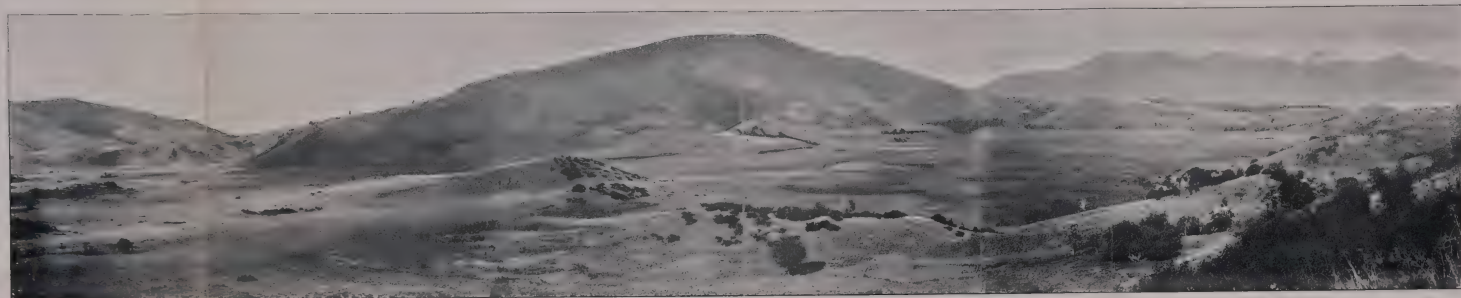
The extensive plain of Maipu is the old bed of the eastern extremity of Lake Lacar, which was formed after the ancient lake, occupying the whole valley Chimehuin, was reduced to the fjord-like Lakes Huechulafquen, Lolog and Lacar. This plain lies from about 100 metres (328 feet) to 50 metres (164 feet) above the level of the existing lake, and is watered by streams which flow down to the east, south and north. To the north of the plain an undulated and rather broad expanse is met, which leads to a large open valley devoid of any existing river, 800 metres (2625 feet), after having passed low basaltic hills, covered by two small semicircular glacial deposits. To the south, is perceived the line of the

continental water-parting in the fluvio-glacial deposits of the river Quilquihue, which is the outlet of Lake Lolog, and which empties in the river Chimehuin, a tributary of the river Limay.

The Valley Maipu is watered in all its extent by the Calfuco stream, which, losing itself in the central meadows and marshes, rises farther on to the west, to empty in the north-east corner of Lake Lacar, where the new town of San Martin de los Andes is situated. The upper course of this stream is formed by two smaller ones, which run in opposite directions. The one to the south (the larger) descends from the eastern slope of the mountainous mass of Chapelco, which extends from west to east, while the northern rivulet occupies a small depression of quite recent alluvial formation, where, at an altitude of 797 metres (2615 feet) above the sea, is to be found a small moraine about one mile long, the banks of which are perfectly defined and rise by degrees towards the west as far as the tableland. The road between Junin and San Martin (de los Andes) passes by the nearly dry swamp on the depression which is nothing but the old bed of a large river, the waters of which ran from the W.S.W. to join those of the river Quilquihue. The gravel terrace existing there is a continuation of that coming from Lake Lolog, and which served as a rampart to resist its waters and check their spread.

The river Quilquihue runs from west to east, at less than half a mile from the highest point in the swamp, which contains a small accumulation of sand about one yard high. *This accumulation of sand marks the continental divide to-day, and, with the labour of a few men, it would be easy in a very short time, to drain off the water from the river Quilquihue by only removing the sand and mud, and thus to make Lake Lolog discharge its waters into the Pacific, since the river Quilquihue runs only about 6 metres (20 feet) lower than the mentioned heap of sand.* It is useless to say that there is not any mountain ridge at all. Remains of moraines in a hill of 890 metres (2920 feet) above the sea indicate the old barrier of the Lacar glacier at its point of confluence with the Lolog glacier. To the east of this hill, another small depression exists extending the general fluvio-glacial terrace to the south of the Calfuco stream, and commanded to the east by an isolated basaltic protuberance, of a height reaching 984 metres (3228 feet) above the sea. To the east and to the south of this protuberance continues the same fluvio-glacial terrace, and in this another old bed of a river opens out at a height of 834 metres (2736 feet) near the point where the Calfuco stream, coming from the south, turns to the west, and of 800 metres (2625 feet), near the point where the Chapelco stream





BED OF THE FORMER RIVER FROM LAKE LACAR TOWARDS LAKE LOLOG, AT QUILANLAHUE.



joins the river Quilquihue, forming there another case of "continental divide" in the dry bed of a river.

From the above description it is clearly seen that between the outlet of Lake Lolog and Lake Lacar there existed formerly three old rivers, which emptied the waters of the latter lake into the Quilquihue and Chimehuin, but now their dry beds constitute *in this district the continental divide to the east of the Cordillera de los Andes*. These facts are evident, and the morainic deposits are of hardly sufficient height to even interrupt the view. It is also clear that Lakes Lacar, Lolog, Huechu-lafquen, are only the remains of a single lake, which is proved by the level of the fluvio-glacial terrace (where are cut the three old river beds), commencing at 890 metres (2920 feet) in Lake Huechu-lafquen, at 870 metres (2854 feet) in Lake Lolog, at 800 metres (2625 feet), 820 metres (2690 feet), and 830 metres (2723 feet) in the ancient outlets, sloping gradually to the east, until 760 metres (2493 feet), at the confluence of rivers Quilquihue and Chimehuin.

The time will perhaps come when, with the progress of natural erosion, Lake Lolog will empty, through the stream Calfuco, into the Maipu plain, and when a mighty river, like the Huahum, will be formed, which will carry the waters to Lake Lacar, and thence to the Pacific Ocean.

The principal features of this region are clearly shown in maps II. and III., and the photographs in Plates LVII. (Figs. 1 and 2) and LI. (Fig. 1) will also contribute to give an exact idea of them. Plate LVII. (Fig. 1) represents Mount Chapelco, a volcanic mountain which rises from west to east, independent of the Cordillera. The photograph has been taken from the northern moraine and shows to the right (west) the depressions of the Maipu Valley and Lake Lacar, the upper part of the Maipu Valley and the source and stream of Calfuco running to this valley; to the left (east) are seen the fluvio-glacial terraces, where to the east runs the Chapelco stream, an affluent of the river Quilquihue. The Fig. 2 of the same plate is a graphic demonstration that the continental divide occurs as has been stated, to the east of the Cordillera de los Andes. The hills to the west are the last ones that can be considered as the eastern foot-hills of the Andes, and at their base is distinctly seen the fluvio-glacial terrace and the bed of the ancient outlet of Lake Lacar into the river Quilquihue. In this plain the waters that flow to the Pacific and those that flow to the Atlantic Ocean have not a clearly defined line of separation; it wanders according to the effect of rains in marshy little meadows. The Chilian Boundary Commission has provisionally erected there the landmark

No. 259, to show the place chosen to locate the international frontier in conformity with the views of the Chilian Expert as to what is the main chain of the Andes and its summits. The Chilian Expert considers that this point is situated, as ordered by the Protocol of 1893, in a *pass of the mountains*, and calls it "Pass Maipu," as he calls "Pass Ailliquina" (Chilian landmark 258) the ancient outlet of the river Quillayhue, formerly connecting Lakes Lacar and Lolog—represented in Plate LVI,—and as he calls also "Pass Chapelco" (Chilian landmark 260), the Plain of Chapelco between the streams Chapelco and Calfuco, with no more orographical nor grammatical reasons, as plains cannot be called *passes*. The use of this word in the sense in which Señor Barros Arana applies it has created a great confusion in Chile in regard to the true meaning of the present boundary dispute. A "pass" presupposes mountains, and as the Chilian Expert maintains that his proposed line is marked by a succession of passes, the Argentine refusal to accept that line, considering it as situated outside the Cordillera in a great part of its extent, is inexplicable to the Chilian people; but once make it apparent that, for Señor Barros Arana, a *pass* is merely a wide plain, all confusion must necessarily disappear.

As Plate LVII., Fig. 1, shows the landscape between river Quilquihue and Valley Maipu to the west, so Plate LI., Fig. 1, represents the region from a neighbouring spot to the east; and no more convincing proof can be produced that there are not to be found mountain ridges at all, but only moraines which are perfectly distinct, as well as the fluvio-glacial terraces left by the gradual disappearance of the ancient lake and rivers of Chimehuin. The river Quilquihue is seen wandering in the valley, and also its confluence with the river Chimehuin near the foot of the "Cerro del Perro." This plate will show at the same time the inaccuracy of Señor Fischer's statement that the "Cerro del Perro" pertains to a branch of the Cordillera (see page 701).

The surveyors to be appointed by Her Britannic Majesty's Government will be able to verify which of the two Experts' proposed lines, in the vicinity of Lake Lacar, has been traced within the Cordillera de los Andes, and which of the two runs along the main chain, as stipulated in the Treaties. Meanwhile, the comparison between Plate LV. and Fig. 1 of Plate LI. will show how justified the Argentine Expert was in proposing landmarks Nos. 268 to 275 in the summit of the Andes, and in rejecting the Chilian landmarks Nos. 254 to 263, as opposed to the letter and spirit of the Conventions in force.



FIG. 1.



MOUNT CHAPELCO (2304 m.; 7556 f.), SHOWING THE STREAM CALFUO RUNNING TO THE WEST, AND TO THE EAST THE CHAPELCO STREAM.  
(Photograph taken from the North at 800 m.; 2625 f.)

*Valley of Maipo.*

*Fluvio-Glacial Terrace.*

*Hill, 1084 m.; 3559 f.*

FIG. 2.



*Waters running to the Calfuco Stream.*

CONTINENTAL DIVIDE AT QUILQUIHUE (797 m.; 2615 f.).

*Waters running to the Quilquihue River.*



### 3. EXPLORATIONS OF CHILIAN ORIGIN WHICH CORROBORATE THE RESULTS OF THE ARGENTINE SURVEYS.

The results of Argentine surveys in the region near Lake Lacar have been amply confirmed by the opinion of travellers who have explored it, such as Señores Frick, Cox, Philippi, Siemiradzky, Steffen, Krüger and Fischer, the three last having formed part of the Chilean Boundary Commission. The same researches have shown that the continental divide is situated to the east of the Cordillera, and even outside of it in a great part of Patagonia from 40° S. lat., as far as Magellan Straits.

From 1887, the publications of Dr. Philippi upon Señor Serrano Montaner's expedition were reproduced and commented upon. They show that at the height of the river Palena, *the lofty Cordillera de los Andes does not form the waterparting between the Atlantic and the Pacific, but that this lies at a considerable distance east of it on a plateau about 1640 feet high in the Pampas.*

The expedition of Señor Arturo Fernandez Vial, in which Dr. Otto Philippi took part, entered by the "Pass of Ranco" or Ipela, continued along Lake Lacar and returned to Chile by the "Pass Villarica" thus confirming the assertion of Señores Frick and Cox that the waterparting does not coincide with the Cordillera. The attention of the Tribunal is specially called to the sources of these demonstrations. They are all Chilean, or accepted by Chile.

The Chilean Representative, at the meeting of May 8, 1899, cited, as a proof favourable to his contentions, the map of Professor von Siemiradzky, who, in 1891 and 1892, made a journey to the Andean regions. His opinion with regard to the tracing of the boundary line, is not of great value, as the object of his journey was not to make a study of the international frontier; it was only to carry out some geological explorations in those hitherto little-known regions. Besides, the map referred to by the Chilean Representative as being Dr. Siemiradzky's, is the work of Dr. B. Hassenstein, who never visited Patagonia; and it is possible that this cartographer, when using the notes of Dr. Siemiradzky, may have been led into error by the Chilean propaganda, that was at that time more active than ever,—as has been the case with other cartographers who were not acquainted with the text of the Treaties. If the publications of the traveller himself are examined, it will be perceived that there is not one single reference to the boundary question, and that in none of them is Lake Lacar spoken of as being to the west of the summit of the Cordillera, but on the contrary, he always says that it is to the east

of it. Besides, although the principal map alluded to indicates as the boundary line one to the east of the Maipu valley, it is worthy of attention that in the same plate where that map is contained there is another,\* showing the itinerary of Dr. Siemiradzky's journey, in which the boundary line crosses the river Huahum at the same point proposed by the Argentine Expert, leaving to the east the lake and the valley. Meanwhile, the large map attributed to Dr. Siemiradzky indicates a boundary line which agrees neither with the Chilian nor with the Argentine claims, as it cuts the continental divide in the "Huechu Ehuén" stream, east of Fort Maipu, and runs to the south-west and west, so as to leave within Argentine Territory, a part of Chile which is not in question (Plate LVIII.)

The first account which Dr. Siemiradzky gave of his journey, was published in the *Revista del Museo de la Plata*, in 1892, immediately after his return from Patagonia.†

In speaking of this region, he says :—

P. 310.—“At the confluence of the river Quilquihue (with the river Chimehuin) the valley is divided into two equally important branches, the one passing to the north, and then to the west from Junin de los Andes to the Lake of Huechu-Lafquen; and the other follows the same western direction up to the foot of the Cordillera of Chile. The valley of Quilquihue, which is very broad, receives, on the right, a tributary of the stream Chapelco, and crosses without interruption the first trachytic Cordillera of Chapelco, after which the valley divides into two branches, one occupied by the Quilquihue, bends towards the north-west, and ends a league further on, in the great Lake Lolog, which is five leagues long; and the other, to the south-west, passes, a league farther on, through the beautiful valley of Maipu, occupied by the tribe of the Cacique Curuhuínca, and sheds its waters towards the Pacific.

“The Cordillera to the north of Junin is very low. From the mountain of Chapelco, standing 2400 metres (7874 feet) high, to the mouth of the Traful, there runs a continuous steep trachytic chain, which terminates with a great number of sharp peaks.‡ The lakes Lolog, Traful, and Nahuel-Huapi are situated to the west of this first Cordillera.”

Dr. Siemiradzky when he refers to the Cordillera de los Andes, properly so called, refers to it as the *Cordillera of Chile*, and when he employs the word *Cordillera* alone, he means a mountain ridge, contrary to the general use, as though the term “Cordilleras” is applied in Chile in different ways (see p. 306),

\* This map is entitled Uebersichtskarte der Expedition v. Siemiradzky, 1891 und 1892, and is inserted in Petermann's Mitteilungen, 1893, Plate 5.

† Apuntes sobre la región Sub-Andina del Alto Limay y sus afluentes, with a geographical sketch, by Dr. Joseph de Siemiradzky. *Revista del Museo de la Plata*, vol. 3, p. 307, La Plata, 1892.

‡ It will be seen that, in the opinion of Dr. Siemiradzky, this “Cordillera” or ridge, although intersected by the outlet of these lakes, is nevertheless “continuous.”







that term with no addition means, in Chile and in the Argentine Republic, the lofty Andean chain (see pp. 33 and following).

According to Dr. Siemiradzky, the valley of Maipu, bordering Lake Lacar, which empties its waters into the Pacific, is an arm of the valley of Quilquihue, which in itself is a branch of the valley Chimehuin. This observation, hurriedly made by this traveller, has been corroborated by others after more detailed investigations. Thus, Lake Lolog is situated in a northern, and Lake Lacar in a southern arm of the valley. In the sketch map which accompanies Dr. Siemiradzky's report *the Cordillera de los Andes* is marked to the west of the valley of Maipu, under the name of *Cordillera Chilena*.\*

The description which accompanies the map referred to by the Chilean Representative is more complete than the one just mentioned: a Spanish translation was published in the *Anales de la Universidad de Chile*.†

In speaking of the two tributaries of the river Chimehuin, he says:—

P. 147.—“The second, the Quilquihue, a larger and more important river, about 50 metres (164 feet) wide, the broad and fertile valley of which forms the prolongation of the valley of Chimehuin *as far as the interior of the Cordillera*. The height of the passes of the Cordillera are here very inconsiderable: thus, that of Junin de los Andes, according to Rohde, is 680 metres (2231 feet), and that of Lake Lolog 730 metres (2395 feet). The valley of Quilquihue, as well as those of Chimehuin and Colloncura, is noticeable for its temperate climate, as sheep can pass the winter in the open air without any danger. Lake Lolog does not appear to be situated in the place marked by Rohde, and it is also much larger than shown by him, extending 5 leagues (15 miles) from north-west to south-east. It is enclosed between two ridges of granite, covered with an exuberant forest of oaks, cypresses and a kind of bamboo. The lake is only separated from the large and extensive Lake Perihueico *by the principal chain of the Cordillera* of granite composition. With great surprise we found in the western prolongation of the valley Quilquihue, a valley called Huechu-Ehuen (Maipu), barely separated by a low hill which hides a small river, flowing from the ridge of Chapelco, and which empties into the great Lake Picau-Llu (Lacar) *the waters of which flow into Chile*.‡ In the map of Rohde no trace at all is found

\* This rough sketch contains many mistakes, of which the principal are the position of the volcano Quetrupillan (Lanin), and the direction of the Sierra de Chapelco, which is not from north to south, as represented, but from east to west.

† Vol. lxxxv. p. 127, Santiago, 1893.

‡ The translator of the work of Dr. Siemiradzky has added a note to that part referring to “*the waters which flow into Chile*.” This note is of much importance on account of the publication in which it is inserted, viz. the *Anales de la Universidad de Chile*, of which University the Chilean Expert was the Rector,—and also on account of its date, November 1892,—being anterior to the Protocol of March 1, 1893. The note says: “This region has been minutely explored by a Chilean expedition under the command of Captain Arturo Fernandez Vial, in 1887. According to the map which accompanies the manuscript report of this journey, there descends from the mountains of Chapelco, a stream, first running to the north, and afterwards turning to the south-west, which bears the name of Pucaullo, and empties into the Lake Lacar. In the lower part of this river, and not very far from its mouth in the lake, there is a small (Argentine) fort, called Fort Maipu, standing at

of this valley. The mountain of Chapelco which is 2400 metres (7874 feet) high, forms the highest point of the line dividing the waters, as, from one side of it, the stream Huechu-Ehuen flows down to the west, and on the other, the stream Chapelco goes to join the river Quilquihue, which flows to the east." \*

P. 152.—"In Patagonia the Cordillera is low, and particularly the passes of the Cordillera are very low, since the water-parting is in most cases situated outside the main Cordillera (*Hauptkordillera*) on Argentine territory."

P. 153.—"The climate in the region of Lake Nahuel-Huapi, as also in the valley of the Maipu and on the other side of the Cordillera, is very damp."

Speaking of the extinct volcano of Aluminé he adds :—

P. 156.—"This ridge of mountains is independent of the *principal Chilean Cordillera*, which lies several leagues more to the west."

And then he says :—

P. 159.—"Only on the west of the Fort Lonquimay in the *principal Chilean Cordillera* are to be found the original woods of the Araucania."

Therefore, even if the frontier line should have been marked along the continental divide on the map which accompanies Doctor Siemiradzky's account, it must be pointed out that this traveller observes in his Report that the *Lakes Lolog and Lacar lie in the prolongation of the valley Chimehuin, to the east of the principal chain of the Andes*; that the waters of the *Lake Lacar run to Chile*, which necessarily proves that according to him Chile lies to the west of the lake; that the valley of Maipu is on the east side of the Cordillera, and that in Patagonia, *the water-parting lies in most cases outside the main Cordillera, on Argentine territory*. Thus, Doctor Siemiradzky's words are opposed to the boundary line shown in the map referred to, and are in harmony with the opinions of the Argentine Expert as to the position of the valley Maipu and the Lake Lacar, and as to *which country these regions belong*.

Doctor Hans Steffen, who has rendered great services to the Chilean Boundary Commission, gave a lecture in 1892, before the German Scientific Society of Santiago upon the hydrography of the provinces of Valdivia and Llanquihue, in southern Chile, dwelling especially upon the region of the sources

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an altitude of 800 metres (2624 feet). Amongst the tributaries which form the river Valdivia, the stream of Pucaullo is the most easterly." The Chilean Expert then at least knew of the existence of Fort Maipu in 1892, that is to say, before the commencement of the delimitation operations, but not until 1898 has he ever made reference to such existence.

\* This is a mistake; Mount Chapelco runs from west to east, and it is in its northern slope that the two streams just referred to, and which run in opposite directions in the principal valley Chimehuin, take their rise according to the description of Dr. Siemiradzky in his first account of his journey.



of the Calle-Calle, which he stated was explored in 1887 by the expedition under the direction of the Chilean Captain Don Arturo Fernandez Vial. Neither the Report, nor the detailed map drawn up by this expedition has been published, which is surprising, inasmuch as it would have helped to throw light upon the orography of that region which, it has been asserted, was supposed to be so little known in Chile until 1898. Nevertheless, some of the results attained by the exploring party may be inferred from the following passage \* :—

“This new expedition of Serrano as well as the second Expedition sent out by the Chilean Government to determine the watershed between the east and the west coast, has confirmed the highly interesting fact *that in these latitudes the high chain of the Andes does not form the water-parting between the Atlantic and the Pacific Ocean*, but that the water-parting is situated a considerable distance to the east of it on a plateau about 500 metres (1640 feet) high. The rivers taking their rise there and flowing to the Pacific Ocean, have their sources in small lakes, and cut *their way through the Cordillera in narrow ravines, which it is difficult to pass. The land on the eastern slope, and as far as the watershed, forming, according to Chilean views, the frontier between Chile and the Argentine Republic, is pampa, very well adapted for cattle-rearing.* The second expedition above mentioned, in which Student Otto Philippi took part, travelled over *the Ranco Pass to the east side of the Cordilleras, and returned by way of the Pass of Villarica.* In consequence of the determination that the water-parting is not coincident with the Cordillera, new negotiations will undoubtedly have to be entered into between Chile and Argentina.”

The above communication written, or at least published, in German, expresses in the true language of science the plain facts of the case, and perhaps explains the reasons for reserving the Spanish Report. It is, therefore, very probable that the features observed by the expedition do not favour the theory of the Chilean Expert *respecting the international boundary.* The silence preserved thereon is still more noticeable since there have appeared in Chile a great many publications on Andean geography, from that date (1887) until the present.

The publication containing Doctor Steffen's lecture is not at hand, but in the extracts therefrom, inserted in *Globe* (vol. lxii. p. 256, 1893), and in the *Scottish Geographical Magazine* of the same year (vol. ix. p. 46), it is stated that the “Argentine Fort Maipu is erected upon one of the eastern affluents of the lake.” It is likewise mentioned that “in the last edition of Stieler's *Hand Atlas*, Lake Lacar is erroneously drawn within the Argentine boundary,” an “error” which does not exist, as Lake Lacar actually lies within Argentine

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\* The Chilean Expedition for determining the watershed between the east and west coast. From *Petermann's Mittheilungen*, vol. xxxiii. (1887) p. 253.

territory. Doctor Steffen has based his assertion solely upon the fact that the continental divide occurs to the east of that point ; but at that time he was not unaware that the said lake is situated to the east of the summit of the Cordillera, on its eastern slope, and that, therefore, the watershed of the main chain, and even of the whole Cordillera, occurs to the west of the lake. Lately, in one of his works\* he expresses himself in the following terms, which show Lake Lacar in its true geographical position :—

“The climatic difference in the regions on both sides of the Patagonian Cordillera, registered by the difference in the respective quantities of their precipitation, indicates in the first place, deviations in their normal course of the main water-parting of the continent. And in fact, if we follow the line of water-parting from about 39° S. lat. southwards, we may observe at different places how it diverges in a distinctly arch-like formation towards the east side which has less erosion. The first definite instance of this phenomenon is presented by the course of the water-parting between the *Lacar Lake* in the region of the *Valdivia river*, and the river *Quilquihue*, flowing from the neighbouring Lake Lolog, AND BELONGING TO THE SYSTEM OF THE COLLON-CURA, LIMAY AND RIO NEGRO. *Lake Lacar* forms one of the series of lakes running in a north and south direction which comprises also *Lake Traful*, *Lolog*, *Aluminé*, *Nahuel-Huapi*, etc., all likewise enclosed between old crystalline mountain chains, stretching in a south-east direction; owing, however, to the progress of erosion backwards towards the west, *Lake Lacar* has been drawn within a region of the Pacific drainage. From the east it receives a small tributary, the *Pucaullo* or *Huechu-Ehuen*, by the prolongation of which eastwards to the valley of the river *Quilquihue* may be attained a valley separated by hardly so much as a low hill. Farther to the south, the river basin of the river *Bueno* cuts into the interior of the *Cordillera* to about the same depth as does the river basin of the *Valdivia*.

“Still further south, are to be observed cases of a complete through piercing water-parting, where the main crest of the *Cordillera* is cut by a series of well developed river courses. Such probably is the case with the river *Puelo* which discharges into the *Reloncavi Inlet*, and certainly this is the case with the river *Palena*, river *Aysen*, river *de los Huemules*, etc.”

If Lake Lacar forms “one of the series of lakes running in a north and south direction,” and comprising “also Lakes Lolog, Traful, Aluminé, Nahuel-Huapi, etc.,” there is no doubt that this lake is situated to the east of the main chain of the *Cordillera*; and that, “owing to the progress of erosion backwards towards the west, the lake has been drawn within the region of the Pacific drainage.”

The last words of this quotation are most important. From them must be inferred that if the waters of Lake Lacar have been drawn within the region of Pacific drainage (as is also the case of the *Palena*, *Aysen* and *Huemules*),

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\* *Reiseskizzen aus den Cordilleren von Llanquihue*, von Dr. Hans Steffen in Santiago de Chile. *Petermann's Mittheilungen*, vol. xi. 1894, p. 149.

ivers), this is an exception to the general rule. The phenomenon of capture of the waters of a lake, belonging to the series of those on the eastern slope of the Cordillera—a phenomenon which has sensibly modified the watershed of the Cordillera de los Andes, as pointed out by Doctor Steffen himself—is, therefore, abnormal.

Señor Oscar de Fischer, one of Doctor Steffen's fellow explorers, visited in 1894, as has been stated, the valley of Chimehuin and Lake Lacar, which he thus describes \* :—

P. 184.—“ We followed the valley at the foot of the Cordilleras, and soon climbed a high hill on the north, from the top of which we saw the large valley of the river Chimehuin, the outlet of Lake Huechu-Lafquen, *on the bank of which the small fort Junin is situated*. We descended into the valley and hurriedly continued towards a large tributary on the right bank of the Chimehuin, the river *Quilquihue*, which flows out from a spacious valley to the west, shut in between mountains of considerable height. The Chimehuin valley is likewise bounded on the east by a ridge of considerable height, crowned by the characteristic dome of the *Cerro del Perro*. This ridge, which starts from the Cordillera north of the Huechu-Lafquen, should, in my opinion, be nevertheless regarded as a rampart of the Cordillera de los Andes. Its formation seems to be neoplutonic, as are also the ramparts of the Cordillera in this region, both on the east and on the west.”

Further on, referring to his journey across the Cordillera de los Andes to Valdivia, he says :—

P. 190.—“ At 7 P.M. we halted on the bank of the river (*Quilquihue*), near a point where it flows out towards the north *from a narrow canyon of the Cordillera*. In this direction lies Lake Lolog, in which the river has its rise.

“ At 7.30 A.M. of the 26th, we deviated to the south-west in order to climb the low hill which unites the *Chapelco Mountains* with the high Cordillera on the north. This hill is crossed by a saddle, well defined, the height of which, 860 metres (2822 feet), differs by only thirty metres from that of our last encampment. It is, however, a watershed of first order, a minor branch of the river *Quilquihue* descending on its eastern side, and on its western, the rivulet *Huechu-Huehuin* an affluent of Lake Lacar, the outlet of which, the river *Huahum*,—is a tributary of the fluvial system of the river Valdivia. Through this pass we entered the fine plain or *Valley Maipo*, so called from the small fort of the same name established by the Argentines, after the termination of the campaign against the Indians, and the extent of which is about six kilometres from east to west and two from south to north.

“ We now found ourselves on the west of the continental divide, but we nevertheless had before us still a two days' journey in districts temporarily under Argentine jurisdiction.” †

\* Anales de la Universidad de Chile, vol. 88, Santiago, 1894.

† These words “temporarily under Argentine jurisdiction” are again manifest proof that every one in Chile

P. 192.—“The low hill, about two kilometres in extent, already described, unites the extremities of the two ridges; that of Chapelco to the south of Lake Lacar, and that of Hualum to the north of this reservoir.\* These two ridges reach so great a height that it is very doubtful whether higher ridges are to be found farther west, with the exception of the conical volcanoes Villarica, Rinihue, Quetrupillan and Lanin, which through their nature and situation cannot be taken into consideration in speaking of the main Cordillera.†

“After a sketch of this important spot had been made, and the aneroid readings registered, we continued our journey, descending to the plain, and we reached the fort of Maipu at 10:30 A.M. From here we scaled the heights on the north by a series of step-like tablelands, partially covered with not very dense undergrowth. The trees which prevailed on the heights were principally cypresses; on the tablelands, coihue and apple trees. The bamboos were abundant, although they do not reach any great size. We then entered a fertile plain where we made a halt. With the exception of the height which leads to the above-mentioned tablelands, the way traversed until now had been very good, and yet these hills did not present very great difficulties for animal traffic.”

P. 193.—“In the latter plain (Plain of Maipu) we saw a large number of cattle. To the north it is separated from Lake Lolog by the high ridge of Huahum. Whilst this ridge preserves the character of all the eastern mountain ridges—that is to say, neoplutonic, the mount which separates it from Lake Lacar on the south, is composed of an exceedingly coarse-grained granite, having large tracts of mica which shine like silver.”

P. 194.—“Tuesday, February 27. We started at 8 A.M., to begin at once the ascent of the steep hill on the south. We first came to a beautiful tall forest of raulies (water ash) and dense bamboos, between which the road is well opened out. We now saw the green surface of Lake Lacar at our feet, and we hurried to descend the steep hill until we reached a large plain which extends to the north of the lake. Here we deviated from the road to register the aneroid readings on the shore of the lake itself, where we arrived at 10 A.M.

“The lake is similar in character to Lake Todos los Santos. Its breadth varies between two and five kilometres (1·24 and 3·11 miles), but towards the west there is a strait where the distance between the two banks is less than one kilometre (0·62 mile). The trend of the main axis is more or less west to south, and the windings between the steep mountains which shut it in, prevent its whole extent being observed. A notable difference between this lake and those of Todos los Santos, Chapo, Nahuel-Haupi, etc., is the shore composed of small stones and sand which encircles it at the foot of the mountains. Its height above the sea is 640 metres (2100 feet). Its western extremity, which is separated from the main lake by another strait even narrower than the one we have just

knew that the Argentine possession of Lake Lacar was never disputed before 1893, and that it was never claimed until 1898 by Chilean authorities.

\* Whenever observations made by the Expedition were not sufficient, names and other data have been taken from the “Plan of the Sources of the River Valdivia,” by Señor Arturo Fernandez Vial, which exists in the Archives of the Chilean Boundary Commission (Señor Fischer’s footnote).

† Señor Fischer does not say that the Chapelco ridge runs from west to east, nor that it is separated from the Cordillera de los Andes.



mentioned, bears the name of *Lake Nontué*. At 11 o'clock we reached the last Argentine police post, *Quichupino*. The inspector is a Chilean named Torres."\*

"We continued along the borders of the lake by a road which passes through little fertile pampas, encircled by woods, and we halted some hours near the edge of Lake Nontué. At 4.30 we reached the ford of the river Huahum, which drains Lake Lacar, and crossed it with some difficulty as the river is deep with swift currents. Upon the other side is a human habitation, and thence the path alters its south-westerly direction and runs parallel to the river Queñi, which drains the lake of the same name and flows into Lake Nontué. I was told that a road leading from this point through the valley of Huahum until beyond the Cordillera has been abandoned, although offering the advantage of not being blocked by snow during the winter. In any case, it appears to me that the opening in the Cordillera formed by Lake Lacar and its outlets, must offer exceptionally favourable conditions for the construction of a convenient road, or perhaps a railway. The river Queñi presents a most picturesque rapid near the outlet from the lake, and we halted here during the night.

"Wednesday, February 28. The weather had hitherto been splendid, but it broke up during the night, and at 2.30 A.M. we were aroused by a heavy shower, which kept us awake until daylight. This rain was extremely inconvenient to us, as to-day we had to survey a section of the road which even under normal conditions presents many difficulties.

"This was the Ipela gap, which leads from the fluvial basin of the river Valdivia to that of the *River Bueno*.

"We saddled our horses at dawn, when the rain had diminished, and followed the border of Lake Queñi. The route was a bad one in these circumstances, and moreover was interrupted at short intervals by large trees fallen across the path. We arrived at the Queñi 'pampa' at the southern border of the lake, and we thence branched off westwards, entering upon a narrow ravine, which soon trends southwards, its termination being hidden between high and steep 'cerros.'

"The road runs along the flank of the hill towards the south, and offers no other difficulty than that of being excessively narrow, a circumstance which renders a meeting with a party coming in an opposite direction extremely inconvenient and even dangerous."

P. 196.—"After an hour's rest we climbed the slope which divides the waters of the basins of the rivers Bueno and Valdivia and which attains a height of 1440 metres (4724 feet). From thence the ground begins to descend with great rapidity; but although the rain had damaged the road, it offered no great difficulties in the first half of the hill, until arriving at a sort of platform, called the 'descanso de Ipela,' 1180 metres (3871 feet). From that point the road goes zigzagging through a very steep declivity. At various distances the water had completely carried away the shallow layer of humus covering the rock, thus showing the natural stone which offered very few points where the animals could safely step. At one spot of this kind two loaded mules fell down, fortunately without injuring either themselves or the instruments. In other parts, lower down, where the rock is covered with a thick layer of mud, the path has been hollowed out partly by the wear

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\* The attention of the Tribunal is called to this fact asserted by an explorer of the Chilean Staff and published in Chilean reviews. Foreigners are admitted in the Civil Service of the Argentine Republic, and the same occurs in Chile, as Señores Steffen and Fischer, amongst others, may testify.

and tear of traffic, and partly by water, forming a narrow and deep way or open tunnel, the bottom of which consists of a soft mud in which the animals sink to their knees. Señor Cox called this part of the road '*infernal*,' and I cannot imagine a term more graphically descriptive. *The mishaps encountered and the difficulties endured owing to the above circumstances so retarded us* that we only reached the foot of the pass, 780 metres (2559 feet) at 5.30 P.M.

"Thereafter, we continued through the ravine below by the banks of the river *Folil*, which we crossed five times until the darkness compelled us to stop, without finding forage for the animals, on the immediate bank of the river."

Doctor Paul Krüger, one of the members of the Chilian Palena Expedition, reporting his observations, and referring to the return over the Cordillera, says \* :—

P. 95.—"After sufficient preparation we started on our homeward journey to Chile (from Junin de los Andes) on February 25th, the 66th day of our expedition. For the crossing of the Cordillera we chose the Lacar-Ranco Pass, west of Junin. The direction of our march was at first south-west, over mountain saddles, upon which the pass ascends to a height of 1030 metres (3379 feet), to the upper Quilquihue river, which was crossed at a height of 830 metres (camp 43) and  $40^{\circ} 5' 6''$  south and  $71^{\circ} 14'$  west. Not far from this place is the interoceanic water-parting, that is to say, at the entrance into the Cordillera, reaching far out to the east, there is also the height of Chapelco, that separates the Chapelco brook—which flows in an eastern direction into the Quilquihue—from the rivulet of Maipu, which empties into the Lake Lacar, and flows towards the west through the Huechu-Huehuin valley: the waters of this lake run down to Chile. The hills which form the Boquete (entrance) and which are wrongly put down on the Argentine map by J. Rohde, are 860 metres (2822 feet) high; their location differs only a little from the camp already mentioned, the position of which was astronomically fixed. The Huechu-Huehuin Valley, west of the water-parting, is of considerable extent; *it is fertile, and has already been colonised by the Argentine Republic.* . . ."

P. 96.—"After the crossing of the deep Hualum river, which is the outlet of Lake Lacar, 630 metres (2067 feet), the direction of our march changed to the south-west, in order to get to the district of the Ranco Lake. . . . The ascent to the high Cordillera leads through dense *coligual* bushes to the second watershed between the Lacar and Ranco Lake districts, over a very carefully hewn out path, which is not very steep. Three waterfalls of 980 metres (3215 feet), 1170 metres (3839 feet) and 1240 metres (4068 feet) indicate the rise. The top of the pass is half an hour's distance from the last Pampas, Nihualhue, 1360 metres (4462 feet); the pass attains a height of 1440 metres (4724 feet), is wooded and narrow, and in the middle there is a small swamp.

"Steep and difficult is the descent to the bank of the Folil brook, which flows toward the west through the *Cuesta de Ipela*; this latter has a declivity of 600 metres (1969 feet), in a comparatively short distance. The resting place (*descanso*), which is in the middle, is

\* Verhandlungen des deutschen wissenschaftlichen Vereins zu Santiago de Chile, 1895, vol. 3.

1180 metres (3871 feet) high, and the foot of the slope 780 metres (2559 feet). The soil contains mud, deeply cut into by water and entirely soaked by the rain. In the very middle of the ascent lie big slippery blocks of rock upon which all our animals continually fell, including the experienced and tried mule which carried the instruments. Though we got off the horses and gave the luggage our full attention, it took us three hours to get the caravan out.

"The real Chilean forest begins with the Folil river, which runs through a deep and narrow valley, and which has to be crossed several times; on account of the damp climate the forest is richer and thicker in vegetation than on the eastern slopes of the mountains. We were forced to close our fourth day of travel by a bivouac which offered so little food that the horses ate their saddle stuffing, which consisted of straw, overnight."

Only one observation, but one of true importance, may be made on the Report of Doctor Krüger. He says that for the crossing of the Cordillera they chose the Lacar-Ranco Pass. If the summit of the main chain of the Cordillera were at "Maipu Pass" or "Chapelco Pass," as asserted by the Chilean Expert in his proposal for the boundary line, Doctor Krüger would surely have said:—"For the crossing of the Cordillera we chose the Maipu Pass, or the Chapelco Pass." Doctor Krüger further stated that the *interoceanic water-parting* is situated "*at the entrance into the Cordillera*" (that is to say outside the Cordillera), "*reaching far out to the east.*" This assertion of a scientific man, who has personally surveyed the region, is the best demonstration of the incorrectness of the Chilean Expert when he says that the two "*passes*" Maipu and Chapelco are on the summit of the main chain of the Cordillera.

The transcriptions from Señor Fischer's diary need also some comment. He states in the first place that the valley of Chimehuin is "bounded on the east by a ridge of considerable height crowned by the characteristic dome of the Cerro del Perro," a ridge which juts out from the Cordillera to the north of Huechu-Lafquen, and which, in his opinion, must notwithstanding "be regarded as a rampart of the Cordillera de los Andes." Nothing is less in harmony with facts than this opinion of Señor Fischer. There exists no such ridge jutting out from the Cordillera de los Andes. As will be observed by the surveyors to be appointed by Her Britannic Majesty's Government, the valley enlarges to the north, the low hills limit it to the east, and are far from forming a ridge of considerable height. The town of Junin de los Andes, situated on the bank of the river Chimehuin, is 780 metres (2559 feet) above the sea, and the altitude of the characteristic dome of the Cerro del Perro, which crowns the so-called ridge, is 1050 metres (3445 feet). This is an isolated hill of volcanic

origin, independent of those which are to be seen to the south-west. To contend that Junin de los Andes is situated in the interior of the Cordillera de los Andes, is like maintaining that the Chilean cities of Osorno, La Union,



CERRO DEL PERRO (1050 m.; 3445 f.).

Villarica, etc., are in the heart of that Cordillera.

Señor Fischer then says, that on February 25, he encamped near a "place where the river Quilquihue flows out towards the north from a narrow canyon of the Cordillera, and that "in this direction lies Lake Lolog in which the river has its rise." This statement is again erroneous, for Lake Lolog is not situated to the north, but

to the west of the site of Señor Fischer's camp. No such narrow canyon exists, and Lake Lolog is a remnant of the old Lake of Chimehuin, as is the case with those of Huechu-Lafquen and Lacar. Neither does the high Cordillera to the north exist communicating by a low hill with the mountain of Chapelco. Señor Fischer says he "climbed" this "low hill" which is crossed by a saddle well defined, the height of which, 860 metres (2822 feet) above the sea-level, only differs some 30 metres (98 feet) from that of his last camp on the shore of the river Quilquihue. This "saddle," which in fact is the old bed of one of the eastern outlets of Lake Lacar, measures, according to accurate observations, 800 metres (2625 feet) above the sea, and forms, *as has been said, the continental water-parting to the east of the Cordillera de los Andes.*

If all these quotations are carefully studied, it will be seen that, notwithstanding the errors already noted and some others that might easily be detected, the opinions of the Argentine Expert are fully upheld by those authors. All of them are scientific men, personally acquainted with the ground, having undertaken their expeditions either in the service of the Chilean Government, or as independent explorers whose works Chile highly respects.



#### 4. CUTTING OF THE RIVER HUAHUM BY THE BOUNDARY LINE.

It is not possible to admit that the Argentine Government, when the Protocol of 1893, in accordance with the Chilian Government, removed the difficulties which had arisen between the Experts, had any idea of modifying the Treaty of 1881, as regards *the best and natural frontier line*, and even less of carrying that frontier *to the eastern plains*. It is also impossible to suppose that the Chilian Government had after a lapse of over a century, sought for an impossible limit such as that which Chile temporarily had in colonial times, when before the erection of the "Virreinato del Rio de la Plata," in 1776, she exercised her jurisdiction over the Province of Cuyo.

To prove that this was not the case, that is to say, to show that the Argentine Republic and the Republic of Chile re-affirmed in the said Protocol, the traditional boundary along the highest crests of the main chain of the Cordillera de los Andes, it only suffices to read Article 2, which clearly establishes that :—

"in the opinion of the respective Governments, and *according to the spirit of the Boundary Treaty (of 1881)*, the Argentine Republic *retains her dominion and sovereignty over all the territory that extends from the east of the principal chain of the Andes to the coast of the Atlantic, just as the Republic of Chile over the western territory to the coast of the Pacific.*"

Such language was the precise expression of the two Governments, emphasising in unmistakable terms the meaning of the Treaty of 1881, and the decision of both nations of defending their territories: the Argentine Republic from the Atlantic to the summit of the main chain of the Andes, the Republic of Chile from the Pacific up to the same line, which has been, and will always be the division and unalterable frontier between them.

The Argentine Government would never have withdrawn their forces from Maipu Fort, situated to the east of the line of the principal heights of the Cordillera, nor divested themselves of the jurisdiction and sovereignty which they exercised in that region—as well as in the valley "16 de Octubre"—just as they would have never tried to bring about the abandonment by Chile of the military posts established in the upper valleys of the Bio-Bio.

During the negotiations of the Protocol of 1893, the Chilian Expert entertained the fear that by following absolutely the line of the highest summits,

the Argentine Expert should claim the said military posts in Bio-Bio to be within Argentine territory. Though the Protocol does not contain any stipulation on this point, the upper valley of Bio-Bio has been recognised as belonging to Chile. On the other hand, the Argentine negotiators in agreeing that the boundary should run along the main chain of the Cordillera, deemed it proper to express that "parts of rivers" would remain to the east of the line, in order to confirm once more that Fort Maipu, the colony "16 de Octubre, etc.," should continue under Argentine jurisdiction. Though these views were engrafted as one of the binding clauses in the Protocol, still the Chilian Expert ignores the Argentine dominion over those regions.

The line traced by the Argentine Expert between the summit of Mount Perihueico and the ridge of Ipela *fulfils the conditions required for a really natural frontier*, while the Chilian Expert's proposed line, which crosses "Pass Carirriño, Ridge Huahum, Pass Ailliquina, Pass Maipu, Pass Chapelco, Range Chapelco, Pass Pilpil and Mount Queñi," leaves in Chile Argentine territory, which has been occupied by military, police and custom posts for more than eighteen years, and where now exist settlements under the protection of Argentine law. Not only would such a line entail a loss of territory to the Argentine Republic, but the frontier would be carried, against every principle of security, to a point which at all times would be the cause of perpetual difficulties.

It is probable that nowhere else in the civilised world does there exist a boundary governed by the conditions in which the line is laid down by the Chilian Expert to the east of the Chapelco Plain. When orographic features like those of that region have been found, the frontiers have been drawn through the gorges which cross the dividing chain, unless historical and ethnical considerations impose another boundary.

In another chapter dealing with this question, various frontier lines have been examined, to which the Chilian Representative has referred, so that here need only be mentioned those which have some analogy with the line proposed by the Argentine Expert, to the west of Lake Lacar. This is done, notwithstanding the belief that the Treaty of 1881, and the Protocol of 1893 are sufficiently clear, with the purpose of showing that not only the Treaties, but also science favours that line.

When a range of mountains separates two countries, the crest or summit of such a range is in every sense the best and most natural frontier. The boundary would naturally follow the crest of the highest part of the chain which constitutes

the normal division of its waters ; and should exceptions exist, they would be considered as abnormal conditions, and would in no wise affect the general rule. Such a division is the *divortium aquarum* of the mountains, and in the case of the *Cordillera de los Andes*, it is the central part of the range that forms the *divortium aquarum* of the said *Cordillera*. It was recognised as such by the Protocol of 1893. If this chain is therefore crossed by a watercourse, this is an abnormal condition which cannot be taken as a pretext for arbitrarily modifying a general natural fact. A river cutting through a ridge or chain of mountains—as is the case with the Huahum River—does not interrupt the chain, and the mountains do not thereby cease to be continuous : there is only a water-gap. This has not only been acknowledged by Chilian geographers and by the Chilian Delegates to the Conference of Buenos Aires, as has been already shown, but is also generally accepted.\*

1. *Turco-Greek Frontier*.—The British Delegate to the International Commission appointed by the Convention of 1881 to trace the boundary line between Turkey and Greece, in his general report on the delineation of the new Turco-Greek frontier gives a full description of the line adopted. Although that frontier does not run along the summit of a high range like the Andes, yet, in accordance with the Convention of 1881, it follows for a considerable distance the watershed in the mountains between Salamvrias, Venetikos and other rivers, and there are one or two points in connection with it that are worthy of special notice, having an analogy with those of the Argentine-Chilian boundary in the regions where the main chain of the Andes is cut by rivers.

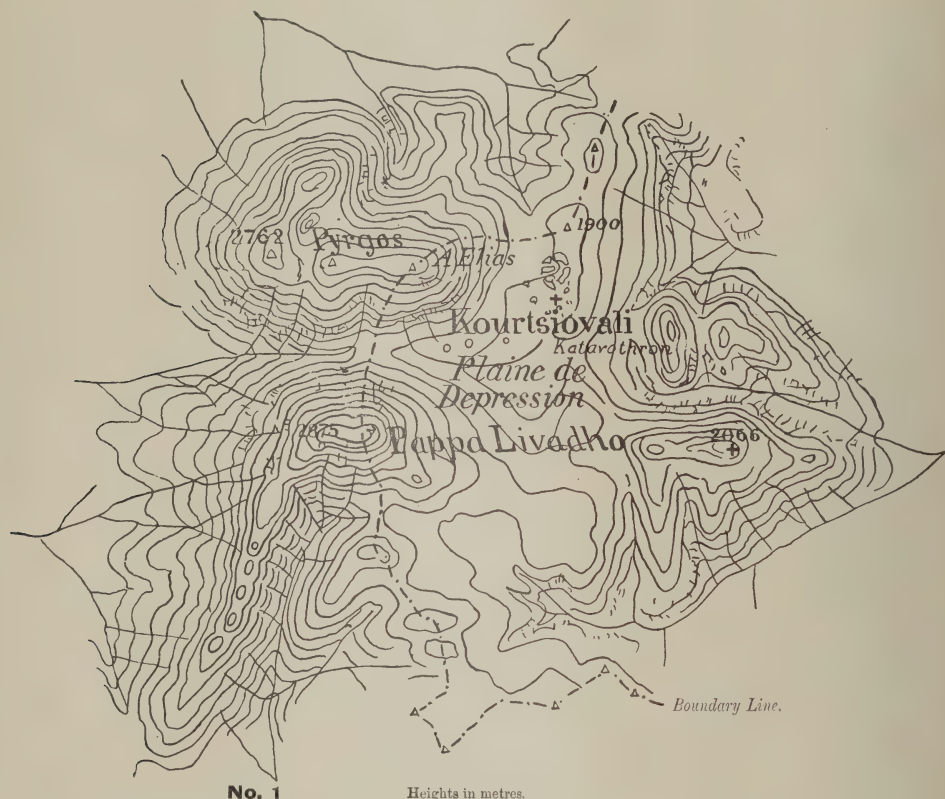
In the Convention are stated generally the directions to be followed by the boundary from place to place, and it only remained for the Commissioners to survey the country traversed by it, and to fix the line upon the ground. Occasionally, however, difficulties arose in the course of their labours, and to this Major Ardagh refers in his Report†. He says :—

P. 138.—“The next controversy which arose was on the subject of Kritzovali‡ or Gurtchova of the Ottoman Commissioner. The foundation of the Ottoman claim is based on the fact that this village lies in a hollow basin with no superficial outlet, and therefore has a crest on either side, its surface drainage finding an exit by a subterranean channel, as is not uncommon in Greece and Albania. As such areas of depression strictly belong to the river basins into which their waters would flow were the subterranean outlet closed,

\* Pages 623 and 631.

† Greece, No. 1 (1882). London. . . . . ‡ In the map it is given as Kourtsiovali.

there was no difficulty in determining that the basin in question belonged to the Salamvrias River system, and consequently fell to Greece. Irrespective of this, the line adopted by the Commission follows the obvious continuation of the mountain range, the low features enclosing the basin on the eastern side being in comparison insignificant."



(From Sheets E 2 and E 3 of the 1 : 50,000 Map of the Turco-Greek Boundary Commission, showing the Kritzovali (Kourtsiovali) depression).

This case is shown by the map here reproduced, which is copied from Sheets E 2 and E 3 of the Turco-Greek Boundary Commission Map.

Further on Major Ardagh states :—

P. 140. —“ At the Lake of Nezeros, called Livadaki on some maps, another contro-



very arose between the Ottoman Commissioner and his colleagues as to which side of the lake the frontier should pass. This lake, like the village of Kritzovali, lies in a basin or depression with no superficial outlet, its waters finding their exit by a "gully-hole" or



Scale 1:50,000; Heights in metres.

(From Sheet E2 of Turko-Greek Boundary Commission Map, showing the Lake Nezeros District).

"Katavothron" where they are utilised to drive a mill. The lowest "col" in the encircling chain of hills lies on the south side, and consequently the scientific water-parting

follows the mountains on the north side. The claim of the Ottoman Commissioner was that the frontier should pass on the south side of the lake.

The reproduction of part of sheet E2 of the Map of the Commission will help to make this case clear.

The two cases are very similar, and have a direct bearing on the differences between the Argentine and Chilian Experts, commencing by that which arose in the *Cordillera de los Andes* in the neighbourhood of Lake Lacar. The Treaty of 1881 orders that "the frontier line shall run along the most elevated crests of said Cordillera that may divide the waters, and shall pass between the slopes



TURCO-GREEK FRONTIER.

which descend one side and the other," and the Protocol of 1893 adds that "the Experts and the Sub-Commissions shall observe this principle as an invariable rule of their proceedings." In the second Article the same Protocol states, that in the opinion of the Governments and "according to the spirit of the Boundary Treaty, the Argentine Republic retains her dominion and sovereignty over all the territory that extends to the east of the principal chain of the Andes to the coast of the Atlantic, just as the Republic of Chile does over the western territory to the coasts of the Pacific."

In each of the two cases of the Turco-Greek frontier a depressed basin or area is off the main watershed, with no actual outflow on the Greek side, but

surrounded in this direction by a chain of low hills, and draining in a north and westerly direction through the main watershed by means of a gully or subterranean passage. It is important to observe that in both of these cases, *notwithstanding this drainage, the basins were considered by all the Commissioners, except the Turkish, to belong to the Greek slopes of the watershed, and that it is clearly stated in the second case that "the scientific water-parting" "follows the mountains on the north side."* The remarks of Major Ardagh that such areas of depression "strictly belong to the river basins into which their waters would flow were the subterranean outlet closed," and that "the line adopted by the Commission follows the obvious continuation of the mountain range, the low features enclosing the basin on the eastern side being in comparison insignificant," have a direct application to the differences between the Experts which have been submitted to Her Britannic Majesty's Government. In fact the streams and torrents flowing from *basins lying to the east of the Andes*, and claimed by the Chilian Expert, abnormally cut through the main chain of the Cordillera, as do the subterranean streams from the basins which Major Ardagh mentions, and therefore the present head waters do not belong to the western slope of the Andes, just as the waters from the depressions referred to do not belong to the Turkish side of the watershed which forms the boundary. The only difference is that in the Turco-Greek case the outlets are subterranean, or covered, whilst in the Patagonian Cordillera they are open; but this difference is of no importance, for it would be absurd to suppose that if at any time the top or covering of the subterranean outlet should be worn away, the basin merely for that reason would be transferred to the Turkish side of the watershed. In both the Turco-Greek and the Argentine-Chilian cases there are instances in which the breaking through of the range by streams may be considered as merely artificial or incidental in the general physical features of the country. The present breaches of the Cordillera are generally the result of the erosion, and it is not impossible that some of the torrents that now cut through the main chain by means of fissures in the rocks, were at first mere subterranean outlets. Such may have been the case with the gorge of the Huahum, taking into account the evidence of great volcanic action in the region, and the transversal fissures filled with lava and tuff, which may have disappeared by erosion acting more readily than in the old crystalline rocks which formed the axis of the southern part of the Cordillera de los Andes.

Contrary to what occurs in the cases mentioned by Major Ardagh, in that of the Lacar there are to the east neither high nor low hills, and there only

exist the beds of the three rivers which formerly drew off the waters from the lake in this direction—which beds are now converted into convenient roads which have facilitated the rapid settlement of this region, peopled by Argentine enterprise. The lake is completely separated from Chile by torrents, steep mountains, and impenetrable woods, and it was never occupied by the industrious population of the Chilian province of Valdivia.

In the case of Turkey and Greece, it was intended to adopt as a frontier the thalweg of a river, when it was possible to keep to it, and the water-parting where the topography of the ground required it: so that the northern slope remained to Turkey, and the southern to Greece.

In the case of the Argentine Republic and Chile it was agreed that the boundary in the *Cordillera de los Andes* should pass along the highest ridge of the range which divides the two slopes, the eastern being apportioned to the Argentine Republic, and the western to Chile.

In the Greco-Turkish case it was decided that, as in Thessaly the Salamvrias, in many points of its course, remained dry during a part of the year, and was fordable at all times, it could not be considered as a boundary line, and, therefore, it was preferable to take the crest of the mountain range, notwithstanding the river and the fact of its intersecting the range, and to trace along this the line of division, since the Salamvrias rather presented the character of a means of communication than that of a barrier between the two countries. In consequence, a survey was made of the line of crests which border on the north, upon the basin of Salamvrias, from the chain of Pindo as far as the block of Olympo, it being the opinion of the technical commission, that this line was the true and just interpretation of what had been agreed.

It was proposed then that the line should follow the crests of the Cani Verni mountains as far as Mount Capka, and then turn towards Demetrius, and pass over the high plateau of Mount Olympo, which is impassable in the greater part of its summits, and, therefore, forms an excellent barrier and natural frontier between the two countries. From the highest point of Olympo, this line descends again towards Mount Egeo, by the shortest line, and the best, i.e. *the most difficult to pass, and the easiest to guard*. It was, moreover, agreed that the boundary should follow the line affording the necessary facilities for vigilance and security.

2. *Transylvanian Alps and the Aluta.*—In the south-east part of the Austro-Hungarian Empire, the Alt or Aluta rises on the western slopes of the Transyl-



vanian Alps, flows parallel with the base of these mountains through Transylvania, and after a course of about 180 miles, cuts through the range by the Rotherthurn Pass into Roumania, where it joins the Danube near Nicopoli. The boundary between Hungary and Roumania follows the Transylvanian Alps, which form the natural line of division between the two countries, regardless of the intersection of rivers. In order to adopt, as the boundary, the water-parting (shown



TRANSYLVANIAN ALPS AND THE ALUTA.

by the dotted line on the sketch map, reproduced here) it would have been necessary to remove it altogether from the Transylvanian Alps, and carry it down into the plains of Transylvania.

The Transylvanian Alps have for centuries past formed a well-defined boundary between kingdoms and races of Central Europe, and served as a barrier which for many years effectually checked the incursions of tribes from the east. They constitute the eastern frontier of Transylvania, and

have also formed that of Hungary in the days when that country was a separate kingdom.\*

It would be impossible to find a boundary more similar to that traced by the Argentine Expert to the west of Lake Lacar. It follows the watershed of the Transylvanian Alps as far as Strunga Sarci, and from there it descends to the source of the stream Valea lui Frate, which it follows as far as the Oltul. From this point the frontier follows the Oltul as far as the mouth of the Reul Vadului, which it ascends as far as its source, and from there it passes on to the Oliersia Ghircului, point between the boundary marks numbered 2011 and 2001, and then follows along the crest of Piatra Ghircului.

The above line is, as regards the principles followed in the tracing of it, very similar to that of the Argentine Expert, which from the Pass of Carirriño crosses over a nameless mountain, 2170 metres (7120 feet) high, Mount Perihueico, descends to the River Huahum, which it cuts at the confluence of the Mahihuen stream and follows this stream up to the summit of the point marked 1800 in the Argentine map, thence through the one marked 2100, and passes across the gorge of Ipela, along Mounts 1920, 2260, etc.

3. The Spol and the Val di Livigno.—The river Spol flowing through the "Val di Livigno" is in Italian territory, and the boundary between Switzerland and Italy is the main chain of the Alps to the east of the Engadine. The boundary line runs along the crest, and it certainly would not be considered to

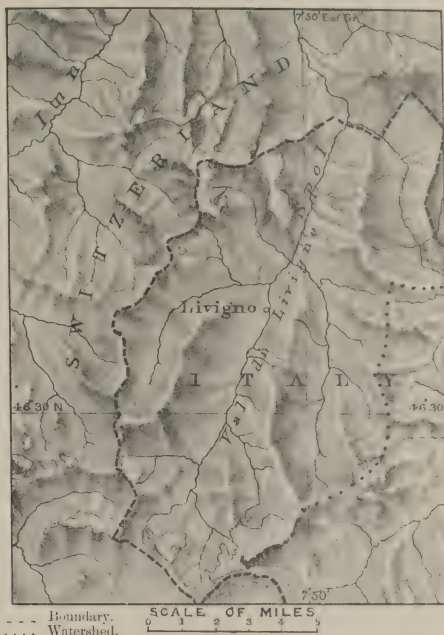
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\* The Boundary Convention concluded  $\frac{25 \text{ Nov.}}{7 \text{ Dec.}}$  1887 is published in the *Moniteur Officiel*  $\frac{10}{20}$  April, 1888, p. 817. Its Art. 5 runs thus:—

"La ligne frontière entre la Hongrie et la Roumanie. . . . De la Cruce la ligne monte de nouveau et reprenant la crête des montagnes passe aux sommets Predealul, Rogoasa, Sirnei, Galbina, Clabucetul, Poiana Seaca, Piatra lui Crain (Bail-Kiralyko, Konigstein), Tamasul Mic, Tamasul Mare, Fagetul Caprei et Serescul à l'ensellement de celui-ci, aux sommets Comisul et Luxele, Herevoescul Mare, Berevoescul Mic, Valea Radului (Vladului) Bratila, et à son ensellement, en y côtoyant les lacs sur les sommets; Ludisorul Zirma et son ensellement, sur les sommets de Levata et à son ensellement, sur les quatre sommets de Bandea, sur les deux sommets de Galesescul, sur ceux de Vultoraca, Coltul Vista Mare, Moldovenanu (Ucea Mare), Podragu, Virtopul, Virtoapelle, Vinatura lui Boxeance, Budi, Caprarețul, Paltinul (Lespedilor) et Neyoice à l'ensellement de Scara ou Scariscara, Fundul Boiul, Valea Caldare, sur les sommets: Galbenul, Budislavul, Surul, Lacustelôr, Corociul à l'ensellement Cumpana sur les sommets Tatarul, Kika Fedelesului redescend par sa crête à la Piatra Socului d'où en passant obliquement sur la Piatra-allia va jusqu'à la Strunga Sarci, et de là elle descend à la source du ruisseau Valea lui Frate qu'elle suit jusqu'à l'Oltul. De ce point la frontière suit l'Oltul jusqu'à l'embouchure de Reul Vadului, remonte ensuite celui-ci jusqu'à sa source, et de là elle monte à l'Oliersia Ghircului, point situé entre les côtes 2011 et 2001, et suivant la crête passe sur les sommets: Piatra Ghircului (côte 2001) Forgaci, Curmatura Purgis, Sterpul, (Dealul Negru) Voinasita, Curmatura Voineagului, Voineagul Catanesei (côte 1853) et suivant toujours la crête des montagnes elle va jusqu'à l'ensellement de Curmatura Tigaului (côte 1581), etc."

follow the range at all if it were brought down to include the Spol and the "Val di Livigno," in order to adopt the line of the heights dividing the waters. As it has been traced, the boundary crosses the Spol, and in some respects the case is similar to that of the Andes. The sketch map of the region suffices to appreciate the case, but for more detailed information the Italian and Swiss Government maps should be consulted.

4. The Balkans and the boundary between Bulgaria and Eastern Roumelia. The boundary between Bulgaria and Eastern Roumelia along the Great Balkan has been traced in accordance with the Berlin Treaty, as it has been expressed in pages 435 and following. In the eastern part of the range there is a case which has a direct bearing on the subject under consideration. Here, in about  $42^{\circ} 59'$  N. lat. and  $27^{\circ}$  E. long. *the range is cut through by the River Deli Kamtchik, which rises near the Kazan Peak, and flowing down the northern slopes of the range, continues its course in an easterly direction parallel with the Balkans, by Gradee, Ispuli and Ischodna; after which it turns to the north and cuts through the range, as indicated in the sketch, and, uniting its waters with the Akilti Kamtchik near Sanduktchi, flows into the Black Sea.*



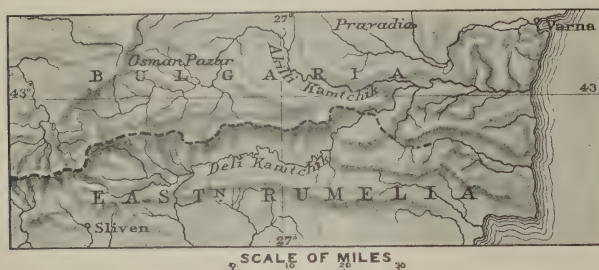
THE SPOL AND THE VAL DI LIVIGNO.

This is an interesting case, and one very much to the point, for if the boundary between Bulgaria and Eastern Roumelia were brought down to the line of water-parting, it would include the whole basin of the Deli Kamtchik, and *it would have to be carried right away to the south of the main chain, as would be the case with the boundary between the Argentine Republic and Chile if it were carried down into the plains to the east of the Andes.*



5. Sweden and Norway.—The analogy between the geographical frontier between these two countries, and that of the Andean Patagonian regions will be generally acknowledged.

An inspection of a map of Sweden and Norway (such as "Norden" by Dr. Magnus Roth) will show that the boundary between these countries, in the north and central parts, runs in the general line of the *principal watershed of the Scandinavian Mountains*, dividing the rivers flowing to the east from those which flow to the west. These mountains are, however, cut in several places by rivers running at right angles across them and, although the general watershed is the boundary elsewhere, *no attempt has been made to carry the line round the head waters of these rivers, as is suggested by the Chilian Expert*, with regard to similar cases in



BOUNDARY BETWEEN BULGARIA AND EASTERN ROUMELIA.

the Cordillera de los Andes. Several of these instances might be mentioned, but it suffices with that shown in the sketch map here inserted, where the boundary crosses a river flowing into the Vefsen Elv.

6. The Tian Shan Range, and the boundary between Russian and Chinese (eastern) Turkestan.—The boundary between Russian and Chinese (eastern) Turkestan south east of Issik Kul follows the Tian Shan Range. Between Issik Kul and this range, to the west rise the rivers Kuilu Inuligek, Ishtik and others, which unite and form the Janart. Immediately after the junction the river flows *through the Tian Shan Range from Russian Turkestan into eastern Turkestan*, which belongs to China. The line of water-parting, including the whole of the river basin, *is far to the west of the Tian Shan Range*, as shown in the sketch map. In this case the main range of the Tian Shan—which is a good natural division—has been taken for the boundary, *crossing the river where it cuts through the range*.



7. India.—It is hardly necessary to mention at length several cases which the Himalayan range furnishes of a similar kind, such as the Sutlej, Indus and Brahmaputra, all of which rise on the northern or Tibetan side, and after flowing for many miles, *cut through the range and flow to the south.* The Himalayan range, chosen as a boundary, is cut by the Sutlej, Indus and Brahmaputra as they rise in the northern slope and in the neighbouring Tibetan plateau.



SWEDEN AND NORWAY.

These cases suffice to prove conclusively that when the Argentine Expert, in tracing the boundary line, crossed the River Huahum and others to the south, he not only complied with the Treaties, but also took into account the scientific precedents offered by frontier lines of several countries.

### 5. ARGENTINE OCCUPATION OF THE VALLEY LACAR.

The Argentine line in the region of Lake Lacar is upheld not only by tradition Treaties and geographical science, but also by justice and political requirements : it leaves within Argentine territory the valley of Lake Lacar which has been always under the political control of the Argentine Republic. The development of its



THE TIAN SHAN RANGE.

settlements has been effected with the greatest publicity, so much so that even Chilian citizens have abandoned their native soil, and, by taking shelter under the protection of Argentine laws, have brought into that zone their labour and activity.

The tranquil and permanent possession of the Argentine Republic must

have produced in Chile a deep impression, which her representative has undoubtedly shared, since he has earnestly (though vainly) endeavoured to minimise its consequences. With that purpose he has put forth, as an argument, the negotiations carried out between the Argentine Minister for Foreign Affairs, Señor Estanislao S. Zeballos and the Chilian Plenipotentiary in Buenos Aires, Señor Guillermo Matta : and he points out that those negotiations suffice to deprive of any importance the unquestionable Argentine possession. Both Ministers in 1889 agreed—

“That the proceedings of one or other Government, which might extend their jurisdiction OVER THAT PART OF THE CORDILLERA OF DOUBTFUL DOMINION, on account of the definite boundary not having been yet traced therein by the Experts, would not affect the results of the demarcation which was about to be made in accordance with the Treaty of 1881.”

This sentence is worded in such clear terms that no hesitation is possible as to its true meaning. It was evidently prudent to avoid conflicts when dealing with *that part of the Cordillera of doubtful dominion*, but on either side of the main chain of the Cordillera de los Andes, up to which the two nations have “*full dominion and for perpetuity*” (Treaty of 1881, Article 6), all exercise of authority was, and is, perfectly legitimate. All the Argentine settlements lie to the west of the Cordillera de los Andes, and consequently within a territory that the Argentine Republic may sway without any hindrance.

Before the so-called Zeballos-Matta Agreement, the Argentine Republic, through public acts, and without protest or opposition from Chile, disposed of lands, founded settlements, established authorities in zones watered by tributary rivers of the Pacific Ocean, though situated to the east of the Cordillera de los Andes. Such Agreement (if that name may be applied to it) cannot be invoked against these proceedings, because it made no mention anywhere of the acts of a date prior to its conclusion ; because it made no allusion whatever to the continental water-parting, extraneous as this is to the provisions of the Covenants ; because it explicitly referred to regions within the Cordillera de los Andes, where the respective dominion of each country could be doubtful, and not to territories to the east or to the west of that Cordillera, where the respective dominion could not be doubtful ; because the Ministers did not intend to alter in any sense the categorical stipulation in the Treaty of 1881, Article 6 ; and lastly, because in the Protocol of 1893, agreed to by both Governments and sanctioned by both Congresses, it was stipulated that the two

interested nations should *retain* the sovereignty that they had always exercised up to the ridge of the main chain of the Cordillera de los Andes.

Some one has said that the Protocol of 1893 is not a treaty of spoliation, and the Argentine Expert always understood that it was not such. A proof of this is to be found in his having accepted the boundary line between the Copahue Volcano and the pass of Santa María, leaving to Chile all the valley of the River Bio-Bio and its tributaries, thus applying on the strength of his powers the letter and the spirit of this Treaty, as well as that of 1881.

The upper valley of the Bio-Bio was occupied by Chile before the time when it was agreed that the boundary line should pass along the main chain which intersects this river. The valley is situated, as has been said, in a bifurcation of the Cordillera de los Andes, and therefore within the zone where the Experts should trace the boundary line. The Argentine Expert, as has also been said, recognised as Chilian the Bio-Bio valley, and its possession has not since been disputed.

When the Treaty was negotiated, Chile had military posts on the valley watered by the Bio-Bio, but at the same time the Argentine Republic occupied the eastern slope, advancing to Lake Lacar. While the former lies in the depression formed by a *bifurcation of the Cordillera*, the latter lies *on the eastern slope of the Cordillera*, and receives waters flowing from lands which must be considered to be at the foot of the slope and yet apart from it. The Argentine forces occupied this region because, from very ancient times, it was considered, although inhabited by Indian tribes, as a part of the Argentine dominion.

It has been seen, from the transcription made from Dr. Frick, that in Chile, especially in Valdivia, *it was recognised that Lake Lacar* was situated on the east of the Cordillera. The passage across the range by some Indians, who descended the River Huahum, the Lake Perihueico and the River Guailletue as far as the Lake of Riñihue, was remembered with interest as an indication of a possible communication by water between the two slopes, and even between the two oceans. The hostile Indians inhabiting these regions, jealously guarded the Cordillera, which served them as a bulwark against the approach of travellers; and the Chilian Engineer Cox could not accomplish his journey as far as the Atlantic on account of this opposition, and Captain Chaworth Musters also found it impossible to effect a crossing there.

Doctor Moreno, the present Argentine Expert, visited the River Quilquihue,



near Lake Lacar, in January 1876, and a meeting of the Indian chiefs took place on account of his journey, at Quem-quen-treu, a place in the neighbourhood, where he asked permission to cross the Cordillera. These Indians considered this territory as entirely Argentine; they knew that Chile was on the other side of the Cordillera of Ipela; and in their meetings, such as this one mentioned, they carried the Argentine banner as their own. As to the permission asked, they refused it, declaring it dangerous for the tribes *that the pass to the west should be known by a white man, as they might be invaded through it by the Chilian army.* When Doctor Moreno visited this district for the second time, in 1880, there was a fresh meeting, and the same chiefs took part in it, they having risen to oppose the construction of forts to the south of the River Neuquen. Amongst the resolutions which were passed at this meeting was one ordering that preparations should be made to convey their families *to the Chilian country in the other side of the Cordillera* which was still occupied by independent Araucanian tribes.

At the place where is to-day the town Junin de los Andes, the Indian chiefs of the neighbourhood often used to assemble at the call of the influential chief Ñaneuqueo, and the Chilian Araucanian chiefs joined them, being received as foreigners, coming from the other side of the mountain to visit the Mapuches and Pehuenches of the eastern slope.

These hostile Indian tribes kept the villages and farms to the south of the Province of Mendoza, and to the west and south of the Province of Buenos Aires, in a continual alarm. Since the very beginning of her existence as a nation, the Argentine Republic, who as heiress of Spain was the exclusive owner of the zones occupied by these tribes, endeavoured to subdue them and compel them to obey her rule. Successive military expeditions carried out with persevering tenacity during many years were the outcome of that civilising purpose. After protracted sacrifices the intended object has been reached, and, as it has been already stated, when the Argentine Republic's efforts have been crowned with success, when her armies and her capitals have opened up to foreign commerce the southern regions bordering on the Cordillera, when settlements governed by her law and ruled by her authorities have become flourishing—the Chilian Expert pretends to annex to his country territories which Chile never, by public acts, helped to civilise, and in which she consented to the quiet and public Argentine occupation. In 1878 the Argentine Government decided to advance a military cordon with the necessary strength in order to subdue the Indian tribes and

put an end, once for all, to their lootings in the southern settlements. The scheme was publicly studied in its most minute details, and the official documents of the time show that the aim intended with the expedition was to extend the force of the Argentine laws throughout the Argentine territory, described in such documents thus, "*for the Argentine Republic there is no other frontier to the west and south than the crest of the Andes and the ocean.*"

The first line being occupied, the military posts continued to advance. In 1880 the troops had made their way into the triangle formed by the Rivers Limay and Neuquen, and in 1881, at the time when the frontier Treaty was being negotiated with Chile, a division of the Argentine army, under the command of General Conrado E. Villegas, encamped on the shore of Lake Nahuel Huapi, some detachments being pushed on to the south of the lake, and even penetrating to the centre of the Cordillera.

These movements of the Argentine army were no secret. They were reported in the daily papers, and yet gave rise to no alarm whatever in Chile. Far from it, Chile sent her army within her own territory against the common foe, and the commanders kept up friendly relations with those of the Argentine troops.

The Argentine brigade that had operated on the eastern slope of the Andes, had come across tribes whom it was necessary to fight, and who were encamped in the upper valley of the Bio-Bio River. The chief Quinchau, with four hundred lancers, lived at a place called Lonquimay, now a Chilean colony in the valley of the Bio-Bio, and took part in the attack on the Argentine fort of Chosmalal, dying from wounds received in the engagement. The Araucanian chiefs, Queupo, Gayquillan, and Zuñiga, were encamped on Lake "Huntué," the source of the Bio-Bio; the upper part of the valley had not yet been occupied by the Chilean army.

The Argentine forces went over the whole of the region of the triangle between Rivers Neuquen and Limay, and some detachments reaching Lake Lacar on March 29 in that year (1881), found there the tents (toldos) of the Cacique Curuhuinea, and occupied the valley already abandoned. The account of this advance by Major Baltazar Peñiñory shows that the Argentine troops knew that this valley crossed the Cordillera, and that its waters emptied to the west.\*

At the beginning of May, Major José A. Daza reconnoitred the same

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\* Expedición al Gran Lago Nahuel-Huapi, Anexo á la Memoria de Guerra, Buenos Aires, 1881, p. 160.

places, from the Vega de Chapelco in the valley of Lacar, which the Indians had abandoned, and crossed as far as Lake Metiquina, situated to the south of Lake Lacar. No Chilian soldiers had crossed the Cordillera, nor tried to do so until that moment, nor have they since. *The great chain separated the two jurisdictions, and the snow-covered dividing line was sufficient indication of the limit.* The documents of the period speak of the eastern and western sides, and of the high ridge separating them, without ever mentioning that the course of the waters has been taken into account in defining the nationality of the territory.

The campaign of General Villegas was not limited to the march of his division to Lake Nahuel-Huapi ; in 1882 the operations were continued ; Chile had decided to subjugate the Araucanian tribes in all her territory, and entrusted the task to General Gregorio Urrutia, whose troops overcame the tribes of the provinces of Bio-Bio, Cautin, Malleco and Valdivia, in the western region of the Cordillera. General Villegas subjugated those of the eastern as far as the Rio Senguerr at 45° S. lat. Further south there were no hostile Indians.

The two international forces maintained the relations necessary for the carrying out of their respective plans. The instructions given to the Argentine commanders indicated the parallel march of the two armies. They were as follows :—

“The Chilian forces having to move in January next year, to take up positions, the commanders and officers in charge of detachments (Argentine) are recommended to observe the courtesy due to friendly nations, rendering assistance in everything required of them, and coming to friendly agreement in the operations, in order to obtain the greatest and best possible results.”

The operations having been carried out, General Villegas reported on them on May 5, 1883, stating that—

“Military operations having terminated, those of occupation began, and on my retirement with some forces into winter quarters *there were established parallel to the Cordillera three forts and three blockhouses which, from Nahuel Huapi to Pulmary, guard the principal roads leading to Chile.* These forts and blockhouses are situated in the following places :—at Nahuel-Huapi, Fort Chacabuco ; *in the Vega Chapelco, Fort Maipu* ; Cuncunien, on the Rio Chimehuin, Fort Junin ; at Huechu-Lafquen, the ‘Teniente Lazcano’ blockhouse ; at Mamui Malal, the ‘Capitan Cruzeilles’ blockhouse ; and at Pulmary, the Paso de los Andes blockhouse.”

The Chilian Colonel Urrutia had in his turn operated successfully to the

west of the Cordillera, and informed General Villegas to that effect. In the diary of General Villegas' campaign, under date of January 2, 1883, it is said :—

“General Villegas has received communications from Colonel Gregorio Urrutia, in command of the army of the south of Chile, which in the month of December (1882) operated in Araucania, seizing various passes of the Cordillera, and effecting the absolute extermination of the Araucanians and the annihilation of these tribes, the masters for centuries of a strip of territory, from which they swooped down like condors of the mountains to spoil and lay waste the neighbouring villages beyond.

“Colonel Urrutia explains the attitude of his country regarding this war against Indians with these words, that we repute to be sincere :—‘I can assure you that the intention of the Government of Chile is to prevent the depredations which until now have been carried on, and there is no doubt that the object will be attained, since in this year the occupation of Araucania will be definitely completed, because I have been able to see myself that all the tribes who formerly neither obeyed nor respected our laws have submitted to them willingly, and without any other conditions than that some customs should be respected which are not opposed to good order, and which for the present it is not advisable to suppress.’\* ”

“In another part of his letter, Colonel Urrutia says :—‘I am assured that these (speaking of Indians driven from the Argentine Republic and who had taken refuge to the west of the Cordillera) to the number of fifty, according to some, a hundred and even more according to others, *have come for refuge to our territory*, and, as you may suppose, we cannot but allow them this shelter on condition that they live subject to our laws, *and abandon for ever their nomadic life, as well as the depredations they have been accustomed to make especially in that Republic (Argentina). This they have done, but their promises have not been enough for me. For this reason I have imposed on them the obligatory condition of residing to the west of the forts I shall establish. . . .*’ Villarica (to the west of the Cordillera), concluded Colonel Urrutia, ‘will soon be a commercial centre, where you will be able to find supplies if you need them. Even now you can get flour at eight dollars a hundredweight, and I think that in a fortnight or three weeks the price will not exceed six dollars, with various other articles in proportion.’ ”

Colonel Urrutia's letter, as has been stated, was received on January 2, 1883. He was operating in Villarica, and other places to the west of the Cordillera, and consequently *near the scene of the operations of the Argentine troops, and was aware of the forts and blockhouses that these troops were establishing as they advanced to the east of the Cordillera.*

In the same diary of General Villegas, it is stated under dates January 12, 13, and 19 :—

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\* Chile had only in view Araucania, that is to say the western slope of the Cordillera.



"When the Indian prisoners brought by Colonel Godoy encamped, they stated that to the west, and following the shores of the Carreu-Leufu to its source in the Lake of Curné, Indians might be found in the recesses of the former. In view of this, the Colonel decided to strike out to the west of Curulauquen and Huechu-Lafquen by those ravines, instead of continuing by the road opposite the second of the said lakes. . . .

"We encamped at 7 o'clock on a level tract selected by the vanguard, at one league from Huechu-Lafquen, which we have already seen from the summit of the hills, lying among the snow-capped mountains. . . .

"This march has brought us to the western end of Huechu-Lafquen, or as has been said to Mayin-Mapú, *the last Argentine spot, and the limit* of our possessions in the valleys to the east of the Cordilleras. The lake is divided into two parts: the nucleus and the arms, which branch off angularly to the west as far as the dividing line of the Andes. The northern arm has been explored by Major Vidal, and the southern by Colonel Godoy. It is of the latter I shall now speak. . . .

"To reach Mayin-Mapú the road touches the same bank of Huechu-Lafquen and penetrates when the latter ends into the forests of *Coliquas*, returning to the shore, not of Huechu-Lafquen, but of the smaller lake 'Desagüe,' united with the first by a stream or a short confluence. This lake has an almost circular form, and is some metres higher than Huechu-Lafquen. . . ."

The Engineer Señor Bröndsted, who traced the line of forts and blockhouses of the expedition, says :—

"At the north-west end of Lake Huechu-Lafquen rises the extinct volcano of Quetropillan, in all its majestic grandeur.\* Its summit perpetually covered with snow, commands all the surrounding ranges, rising to 3445 metres (11,303 feet), above the level of the sea, and 2685 metres (8809 feet), above the level of the Huechu-Lafquen. Both to the north and south of Huechu-Lafquen there are roads leading to the neighbouring Republic, but these roads or rather paths are very difficult, since their narrowness on the one hand, and the marshiness of the ground on the other, make them almost impassable in rainy weather. . . . On the north side of the Huechu-Lafquen at a place called Cumuyui stands the blockhouse 'Teniente Lazcano' (an officer killed by the Indians) near the entrance to a defile. This blockhouse commands the road that goes to the north of the lake.

"Another blockhouse, to be built on the opposite shores of the lake, will command the road that passes along that side. The spot prepared for the blockhouse is marked on the plan with the word 'Corralitos.'"

Up to the neighbourhood of 40° S. lat. the Argentine forces which had examined the eastern side of the Cordillera de los Andes, making in its passes and entrances forts and block-houses for the defence of the frontier, agreed to

\* It is not, as was afterwards verified, the Volcano of Quetropillan, but that of Lanin, 3700 metres (12,382 feet) in height.

in 1881, had met with no river whatever, cutting the Cordillera towards the west; but when the expedition proceeded as before said beyond 40° S. lat., the troops arrived at Lake Lacar, situated to the east of the Cordillera, and there made a fort. The site chosen had been examined two years before by Major Peñoñory acting under orders, and by Major Lucero. The officer in charge of the expedition had this general instruction :—

“On the land stated in the previous Article you will draw a project of a line of forts, or advanced posts, opposite the passes and entrances, so that, by commanding these, and on account of the strategic situation of the line, it may be suitable for defence.”

On February 10 of that year, Colonel Godoy had received more concrete orders from General Villegas to make a fort in the neighbourhood of Lake Lacar. At that time the Argentine troops were encamped on the shores east and west of the lake to the *east of the summit of the Cordillera*, whilst the Chilian forces were on the other side, *to the west of the summit of the Cordillera*.

Colonel Godoy, on directing the order of his Chief to be carried out, communicated with the commission entrusted with the scheme as follows :—

“The general in command of the division has decided to keep a strong detachment from the third brigade on *the plain of Chapelco, or its neighbourhood, in order to protect the road to Valdivia*. For this purpose he has commissioned Captain Rohde to make the necessary investigations. . . .

“To obtain practical information about the Valdivia road which starts from Chapelco (these roads, as the others mentioned, were Indian tracts) you may yourself, or through the engineer, send a message to Captain Rohde, at present *in those regions*, asking him for the necessary information, so as to be able to fix in the sketch with greater accuracy, the situation of the Vega, of the Valdivia road, and of the lakes and adjoining Cordilleras. The present blockhouse of Calefu must be advanced towards the Cordillera, about six leagues on the bank of the river of the same name.”

Señor Bröndsted, in dealing with the place where the Maipu fort stands on Lake Lacar, describes it in the following words :—

“The valley near Quilquihue is only separated by insignificant downs from the large fertile valley traversed by the stream of Quempu-Callu, generally called that of the Vega de Chapelco. The Quempu-Callu stream runs from east to west, and flows into the eastern end of the Lake Lajara (the ancient name of Lacar) a lake seven or eight leagues in length. . . . Lake Lajara (‘a divided lake’) has two narrow points, one near the eastern end, not far from the Sierra de Trumpul, and another near the western end, close to a place called Nutahue and opposite a range of considerable height, covered with snow, called *Culoquina*. At a short distance from this narrow point is a pass. The waters of Lake

Lajara wash the base of the Cordillera in their whole extent south. On this north side a wide convenient road leads to the extreme west of the lake, and *from there, along the river Huahum, to Chilean territory.* According to the Indians, there exist on the north side of Lake Lajara the ruins of an old blockhouse of the times of the Spaniards, but my efforts to find them were fruitless. *If such a fort existed, its position was well chosen, for the pass would be completely commanded.*" \*

The map drawn by Señor Bröndsted and reproduced here shows this feature : In that map the paths leading into Chile are indicated to the east of "Las Cordilleras."

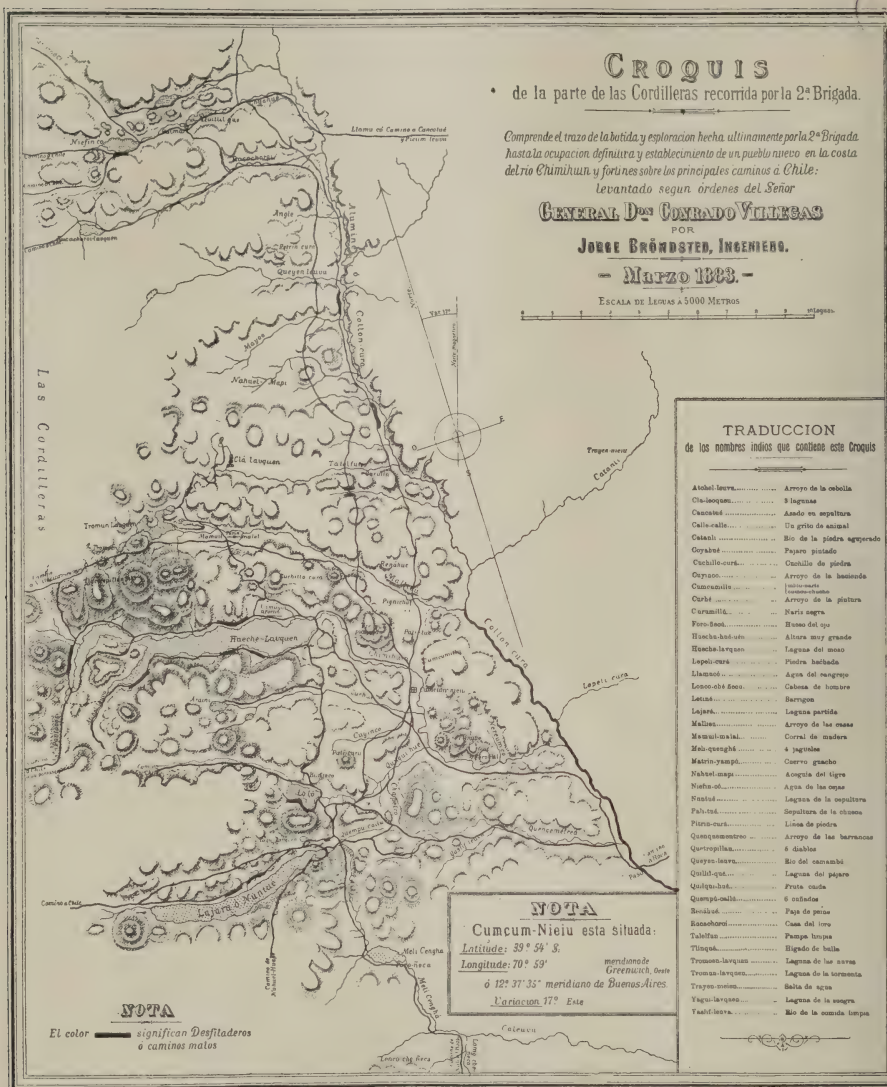
This was the first place in which the troops found that a river cut the Cordillera, and neither the Argentine nor the Chilean commanders *doubted for a moment in 1883*, that the fort of Maipu erected by the Argentine forces *to the east of the summit of the Cordillera, on Lake Lacar, was situated in Argentine territory*, guarding the pass leading to Chile *through the Cordillera*, along the River Huahum.

On the part of Chile, the Argentine jurisdiction in Lake Lacar was always acknowledged. In another place mention has been made of the investigations of Dr. Frick, who maintained that this lake *is situated to the east of the Cordillera de los Andes, on the pampas of Buenos Aires.* Dr. Frick resided in Valdivia, where communication with the Indians was frequent, and according to them the lake was on the other side of the mountains ; in fact, the Indians who lived in the plain of Chapelco were called Mapuches (people of the fields). Señor Barros Arana himself has mentioned this river-communication across the Andes from the first edition of his *Geografía Física* till the fourth (1888). There cannot be alleged, therefore, any lack of information. From the moment of the definite Argentine occupation of the region, the best maps published up to 1889 show the lake as situated *to the east of the Cordillera.* It was only when the Chilean Expert began his agitation trying to substitute for the mountain frontier, agreed to in 1881, that of *the continental water-parting*, that there began to appear in some plans a ridge of mountains to the east of the lake, along which was drawn the dividing line. As a fact, however, this ridge has no existence.

An incident which occurred between members of the Argentine and Chilean armies, showed once more that the Chileans, who were operating on the other side

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\* Probably the tradition of the existence of a blockhouse originated from the word Pucura, applied to that place,—Pucara, in Quichua, signifying military post—and probably in times prior to the Spanish conquest the soldiers of the Inca had there a post, while advancing to the south of Chile and Patagonia.





of the Andes recognised as Argentine territory that in which the Argentine forces were operating at the same time. A surgeon of the Chilian army being found east of the Cordillera was arrested. He stated he came to convey to Colonel Godoy the compliments of the Chilian Major Drouilly (who was with his troops on the banks of the River Trancura to the west of the dividing line in the Cordillera agreed to in 1881), but that owing to the condition of his horses, he had been unable to reach the place where Colonel Godoy was. After an inquiry, the surgeon, Señor Oyarzun, was liberated, but the incident caused a communication from the Chilian commander. In the "diary" of General Villegas it is said :—

"A Chilian messenger arrived at 9 A.M. with letters from Major Martin Drouilly concerning the affair of Señor Oyarzun. The Major proposed, in an irregular manner, a conciliation between the Argentine and Chilian armies, a *modus vivendi* as he calls it, so that both Nations may pass from this side to the other of the Cordillera, on account of the war against the Indians."

General Villegas replied that such an agreement should be negotiated by the Governments, and not by the frontier commanders.

All these antecedents show that from the month of January 1881, that is to say before the drawing up in the same year of the Treaty of July, the Argentine army occupied the plain of Chapelco, and that in 1883 its outposts reached the River Huahum, as far as the place where the dividing line proposed by the Argentine Expert cuts that river, when it descends from the summit of Mount Perihueico, in the main chain of the Cordillera, to ascend again by the edge of the ridge of Ipela.

The tribe of the Cacique Curuhuinea had inhabited for many years past the valley of Chapelco, and raised crops on the borders of Lake Lacar. Curuhuinea—the descendant of an Araucanian chief who had crossed the Cordillera during one of the raids which at the beginning of the century were carried out against the Pampa or Gennakens Indians, who wandered in the neighbourhood of the Limay—had inherited the inclination for agriculture, without giving up hunting, which forms the chief means of subsistence of these tribes. His name appears among the Mapuche chiefs, on the list published in 1876 by the present Argentine Expert;\* but fearing to be considered as an enemy, in spite of his pacific tendencies, he penetrated towards Chile upon the approach of the Argentine forces, who found his 'toldería' (tents) deserted when they advanced

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\* Viaje a la Patagonia Setentrional, Buenos Aires, 1876, p. 12.

to the lake in January and March 1881. At the second expedition of the army, when this region was definitively occupied by the Argentine army, the Cacique Curuhuınca, with his tribe, returned, and submitted to the military authorities.

The fort Maipu was commenced to be built on March 27, 1882, and garrisoned by two officers and forty privates, and by men of friendly tribes as auxiliaries. After completing the pacification of the region, the troops temporarily withdrew in 1890, and the fort was occupied by parties of police. The Argentine authorities have therefore exercised jurisdiction without interruption, as far as the pass of the Cordillera de Ipela.

Before the Treaty of 1881 was negotiated, the Argentine Congress sanctioned an act relating to the disposal of lands in Patagonia on the eastern slope of the Cordillera, once the Indians were subdued.\* This is a new proof that the Argentine Government had always considered this territory as Argentine.

It has been seen that in January 1881 the Argentine troops occupied the valley of Lacar, or Chapelco, dominating the whole triangle comprised between the Rivers Neuquen, Limay and Lake Nahuel Huapi, and the *Cordillera de los Andes*. The boundary Treaty having been signed on July 23, 1881, the Argentine Government, on September 7 of the same year, appointed the surveyors, Señores Carlos Encina and Edgardo Moreno, to measure and divide into sections the whole of that zone. Señores Encina and Moreno presented their Report in August 1884, stating, "The eighth zone comprises Sections XXXV., XXXVI. and XXXVII.; of these, Section XXXVII. is irregular and incomplete;" and, they add, "Section XXXVII. encloses a superficies of 732 square kilometres, (282·7 square miles), and has been divided into 16 lots." Nine of these lots, numbered 5 to 13, *are wholly or in part situated in the plain of Chapelco and in Lake Lacar*, that is to say, within the area which the Chilian Expert considered in 1898 as included in Chilian territory. These lots were indicated with marks and the measurement was approved, together with that of other Sections, on September 9, 1884.

To the Cacique Curuhuınca, who, with his tribe, has rendered important services, the Argentine Government, by decree of January 18, 1888, granted, in the part of the valley which he occupied, the use of twenty-seven square miles for ten years; and by decree of May 14, 1895, the same Government granted to Señor Juan José Rodríguez part of lots 8 and 9 on farming rent.† Small

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\* Act of October 5, 1878.     † These decrees were immediately published in the *Registro Nacional*.

tracts of land were let by the local authorities. The surveyors, Señores Encina and Moreno, asked for lots 1 to 6, and Señor Luis Castells for Nos. 11 to 16, according to the lists published in 1889. The plan drawn under official authority by Lieutenant-Colonel Rohde, of which a part is reproduced here in facsimile, shows the measurements quoted, and indicates the section adjoining Lacar as intended for agricultural settlements, which were actually established and are now flourishing. Plate LIX. represents some of those existing in 1896, and Map III. shows those in the valley and its surroundings. Fort Maipu appears in the maps after 1883, and in the plan, already quoted, of the Engineer Señor Bröndsted.

Settlements on the Chapelco and on the borders of the Lacar having been established, and the Indians having been subdued up to the foot of the Cordillera de Ipela, Fort Maipu was temporarily abandoned in 1890, *as well as the Chilean forts* of Lonquimay, Nitrito and Luicura, on the Bio-Bio, where danger from the savage tribes had also totally disappeared. But Argentine jurisdiction was not thereby withdrawn : it has been permanent, and explorers serving with the Chilean Boundary Commission have acknowledged it.

Señor Oscar de Fischer \* says in 1894 :—

P. 191.—“Through this pass we entered the fine plain or *valley of Maipu*, thus called from the small fort of the same name established by the Argentines after the termination of the campaign against the Indians. . . .”

P. 192.—“In the plain of Maipu were a considerable number of houses, not counting the ranches which formed the fort and served as lodgings for its garrison of four or five soldiers. In the latter plain we saw a large number of cattle. . . .”

He acknowledges that those regions are dependent upon the Argentine authorities, and speaking of the western region of Lake Lacar, he adds :—

P. 194.—“At 11 o'clock we reached the last Argentine Police Post, Quechuquina. The Inspector is a Chilean named Torres. . . . Once in a while attempts are made by the Chilean concessionaires to occupy these lands in virtue of the concessions which they hold from the Government of Chile, but these have always been energetically repulsed by the Argentine authorities, and never have the Chilean authorities wished to intervene in favour of their citizens. The consequence of this indifference on the part of the Chilean Government is that the Argentine Republic has extended her dominions even as far as the Ipela Pass, which is 60 kilometres (37·28 statute miles) west of the interoceanic water-parting.”

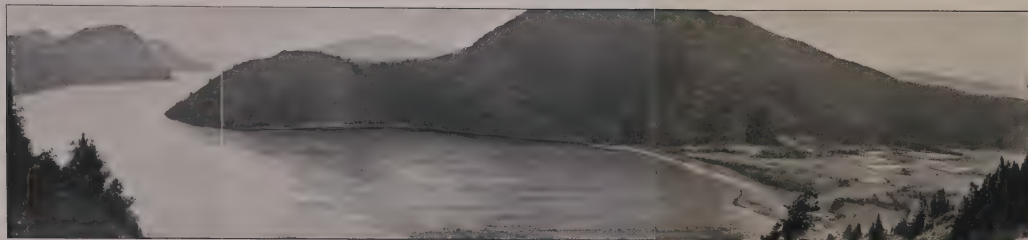
Señor Fischer visited that place, one year after the signing of the Protocol

\* Memoria General sobre las Expediciones Exploradoras del Rio Palena, in *Anales de la Universidad de Chile*, Santiago, 1894.









LAKE LACAR, SHOWING SOME CULTIVATED LANDS EXISTING IN 1896, AT CURUHUINCA VILLAGE, WHERE SAN MARTIN DE LOS ANDES HAS BEEN FOUNDED.



of 1893 : and his words, officially published in the *Anales de la Universidad de Chile*, of which the Chilean Expert, Señor Barros Arana was Rector at that time, could hardly have been unknown to him, as the Report was prepared by an employee under his orders. Nevertheless, notwithstanding the clear demonstration of the actual state of the territory of Lake Lacar, Señor Barros Arana did not consider it necessary to make the slightest allusion respecting the said Argentine occupation to the east of the pretended "main chain of the Andes which divides the continental waters."

And not only had the Argentine Government established police posts at Huahum, at Quechuquina, and at the foot of the Ipela gap, but they had also custom posts, *where articles introduced from Chile paid duties, without the Chilean authorities ever having raised the slightest objection or complaint.*

In 1896, the Argentine Government authorised the navigation of Lake Lacar, and of its outflow towards Chile, and in 1897 they decreed the founding of the Maipu Colony of 450 square miles in extent, comprising the whole of Lake Lacar and its adjoining valleys as far as the top of the Cordillera de Ipela, in the main chain of the Andes.\*

In spite of the wide publicity given to all the arrangements connected with the military occupation, grants of lands, and the establishing of police and custom authorities, and in spite of the immediate knowledge which the Chilean authorities had of these facts, the latter never attempted to make any claim whatever, and it was only at the last moment, *shortly before the meeting of the Experts for deciding upon the general frontier line*, that the Chilean Plenipotentiary at Buenos Aires made representations regarding the cantonment on the border of Lake Lacar, of a detachment of Argentine troops who had founded there a settlement to which the name of San Martin de los Andes has been given. This was the first, and has been the only representation.

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\* The Decree runs as follows :—Buenos Aires, July 21, 1897. In pursuance of the Act of October 2, 1884, the President of the Republic decrees : Article 1.—There shall be created in the Neuquen territory, in the department of Junin de los Andes, a pastoral colony in lands belonging to the Government comprised within the following limits : to the west, the Cordillera de los Andes ; to the north, Lake Loloj, and the river of Quilquihue ; to the east, lands which are private property, and to the south the lakes fed by the River Caleufu.

Article 2.—The name of the Colony is to be Maipu, and is to measure 50 kilometric leagues, subdivided into 200 lots of 625 hectares each.

Article 3.—The National Geodetical Office shall map out the subdivision of these lands, taking care to divide amongst the lots, in due proportion, the more favoured features of the ground.

Article 13.—Let this be communicated and published to the National Register.

The importance of San Martin de los Andes has rapidly increased, and to-day agricultural and cattle farms, under Argentine control, extend as far as Lake Queñi, at the foot of the boundary ridge. Rivers Quilquihue and Collon-Cura are now utilised for commercial purposes, these water-ways connecting that region with the Atlantic Ocean through the rivers Limay and Negra.

The Chilian Minister at Buenos Aires acted in accordance with the views of the Chilian Expert, who maintained that all lands situated to the east of the continental water-parting belonged to Chile, forgetting that he had himself, in his geographical books, taught that the jurisdiction and dominion of Chile only begins with the commencement of the western slope of the Cordillera de los Andes.\*

The Argentine Government had done nothing that could be considered as occupation of territories "*of doubtful dominion.*" The lands referred to by the Chilian Minister in Buenos Aires were the same lands, the use of which (as already stated) was granted for ten years to the Cacique Curuhinca. The foundation of San Martin de los Andes was laid upon these lands at the expiration of this term of ten years. The military establishment in the valley of Chapelco is situated in the same camp that had been occupied for fifteen years by Argentine soldiers.

These facts were so well known, that it sufficed to the Argentine Government to recall them in order to set aside the unexpected Chilian representation.

The establishment of the Argentine fort Maipu, on Lake Lacar, was a logical consequence of the Treaty of 1881. The Argentine Republic had occupied lands situated to the east of the range of the Andes, though the waters that irrigate those lands where the fort was built flow towards the Pacific, traversing the Cordillera. These regions which until then had not been held as Chilian, were, perhaps, considered by the Chilian Minister as lying not to the east, but to the west of the Cordillera, that is to say, in Chilian territory which had been invaded by Argentine forces. Nevertheless, the exploration which the Chilian Government confided to Captain Vial, ought to have dispelled this erroneous belief, it being recognised that as a matter of fact Lake Lacar and the Maipu Valley are situated to the east of the Cordillera. At that time, the Chilian Government deemed that there was no such invasion of Chilian territory, but on the eve of arbitration, and in order to sustain the

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\* *Geografia Física*, 1st edition, p. 298.



Chilian Expert's theories, it was considered in Chile necessary to claim a zone which she never before pretended.

The Argentine Government in reply to the Chilian Minister, stated :—

*"Your Excellency knows that since 1883, the valley of Lacar has been occupied by Argentine authorities, and that there has been in existence since that time, on the lake of the same name, a military fort and the settlements which were the consequence of the same occupation, it being evident that this fact has not given rise to any complaint from the successive Governments until the present time, and that this authorises the conclusion that they understood that the territory occupied lay to the east of the principal chain of the Cordillera de los Andes over the highest summits of which the frontier line between the two countries must run."*

The Chilian Minister did not reply to this assertion, which expressed but the truth, and which showed the policy of the Argentine Government in taking possession of *her territory to the east of the summit of the Cordillera, "the immovable boundary" between the two nations.*

If Chile had proposed to the Argentine Republic, either before or after sanctioning the Treaty of 1881, to divert in any way the frontier between the two countries, from the high crests of the Cordillera de los Andes, the Argentine Republic would have refused this proposal, resting on her undoubted rights of upholding the boundaries of the *Virreinato*, which are the same since her independence in 1810 ; she would have maintained her frontier in the Cordillera, regardless of the extent of land which such boundary would afford her, and *exclusively on the basis of national defence and national economical interests.*

The frontier at the Gap of Ipela had been recognised by Chile for many years. Chile was acquainted with the physical features of the ground, and yet up to 1898 she had not raised any claim, nor had she attempted the impossible task of showing that this frontier might be removed to the west of the Andean summits. This claim at the last hour, which was immediately rejected by the Argentine Government, was apparently made only to show to the Arbitrator a resistance which had never been offered during a period of fifteen years.

Moreover, the Chilian Representative does not deny the Argentine occupation of Lake Lacar, although he has tried to impair its importance by saying :—

*"The proprietors or possessors of lands in that valley are Chilian by origin, or German colonists of that country, and their titles to their property had been drawn up in Valdivia."*

Both assertions are erroneous. The proprietors or possessors of lands in that

valley are not Chilian by origin, nor German colonists of that country. The majority of those proprietors and possessors are Argentine, and it is unnecessary to say that the Curuhuinea tribe settled in that region under Argentine political control is neither Chilian nor German, and that those soldiers of the Argentine army who garrison the neighbourhood of Lake Lacar are neither Germans nor Chilians. If there be a few Chilians, they are subject to the Argentine authorities, they are under the Argentine law, they pay taxes to the Argentine Government. It may be that in Lake Lacar as everywhere throughout the Argentine Republic some aliens may have settled themselves: the Argentine Republic welcomes the men of whatever country who may desire to inhabit her soil, and they enjoy the same civil rights as her citizens.

As to the second assertion, it is a misleading one. The Chilian Representative does not say that the proprietors of lands in the valley Lacar have acquired their properties by concessions from the Chilian Government. This would have been to oppose the evidence resulting from facts. He merely says that the title-deeds "have been drawn up in Valdivia." Even so, the assertion is erroneous, as the instruments delivered to the original grantee are always drawn up within Argentine territory, but if any title-deed has been drawn up in Valdivia, the case may only refer to a private contract. Such a title-deed may be framed in any part without implying disavowal of the Argentine jurisdiction, from which, originally, all legitimate holdings in Lake Lacar are derived.

The Chilian Representative adds:—

"The Government of Chile, however, *tolerated* that the Argentine military authorities engaged in the pursuit of the tribes of marauding Indians who ravaged the regions of the south of that Republic by allowing them to establish a picquet of troops to the east of Lake Lacar, so as to close the passage to those savages."

From this passage it could be inferred that the Argentine Government asked for the Chilian permission in order to send their army to Lake Lacar. Nevertheless, that was not the case: neither was such a permission solicited, nor was it necessary, since the Argentine Government have ample right to place their troops wherever they think it convenient within the limits of their territory. It must be further asserted that should Chile have considered Lake Lacar as a part of her dominions, she would have never *tolerated* there, and even less in silence, the encampment of foreign troops nor the permanent establishment of foreign authorities, both civil and military.

Moreover, the Chilian Representative's avowal is significant: it is recognised

that the Argentine Republic employed her efforts and her capital in subjugating the savages at those regions, and it is likewise acknowledged that Chile did not object to the erection of the Maipu fort nor to the ulterior settlements which were the consequence thereof.

To sum up, the Chilian line in this section, as in many others, disregards every element which must be weighed in the marking out of the frontier ; the Argentine line, on the contrary, is buttressed by tradition, by the Treaties, by science, by the ground itself, by political requirements, and by justice. The Argentine Expert has defended a zone always considered as belonging to the Argentine Republic ; the Chilian Expert has sought for territorial expansion. This is, therefore, a case to be solved in accordance with Quintilianus' rule : "*Incommoda vitantis melior, quam comoda petentis, est causa.*" The party who endeavours to avoid a loss has a better cause to support than he who aims at obtaining an advantage.\*

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\* Quoted in Blue Book, North America, No. 3, 1873, London.

## CHAPTER XX.

*Summary*—1. DIFFERENCES BETWEEN THE EXPERTS ON THE REGION FROM PEREZ ROSALES PASS TO THE GORGE OF RIVER MANSO.

2. DIFFERENCES FROM THE GORGE OF RIVER MANSO TO THE GORGE OF RIVER PUELO.

**1. DIFFERENCES BETWEEN THE EXPERTS ON THE REGION FROM PEREZ ROSALES PASS TO THE GORGE OF RIVER MANSO.**

THE line proposed by the Chilian Expert, after having encroached upon Argentine settlements in the region of Lake Lacar, reverts to the main chain of the Andes, and follows along it until Perez Rosales Pass, so that the projected landmarks Nos. 263 to 270 correspond with Nos. 275 to 281 of the Argentine line. Those points determine a section of the boundary which has been definitively accepted in accordance with the international conventions, and which by the orographic and climatic conditions constitute a good frontier, "*easy to distinguish and difficult to cross.*"

From the Ipela ridge to the granitic domes which in deeply carved masses form the barrier between the Nahuel-Huapi basin and the Todos los Santos basin, the line runs along high summits with abrupt gorges, and with numerous fjord-like lakes in the two slopes, which conspire against an easy access between Argentina and Chile, rendering there difficult the trade between the two nations, and thus avoiding customs or police conflicts as to the respective jurisdiction.

Lake Nahuel-Huapi, with its branches and former extensions—constituting today several consecutive lakes, among which, are on the north-west Espejo and Correntoso, and on the south, Gutierrez, Mascardi, Guillermo, Hess, Fonk and Vidal Gormaz—occupies nearly a degree of latitude in the eastern slope of the Andes. It is separated from Chile to the north of the western arm by steep mountains, among which may be mentioned summits of 2120 metres (6956 feet), 1870 metres (6135 feet), Mirador, 1700 metres (5578 feet), Pantojo, 1930 metres (6332 feet), and Esperanza, 2040 metres (6693 feet), forming the ideal ridge of



the crest of the Andes, to the eastern side of which Mount Cox, 2580 metres (8465 feet), and to the western, Mount Puntagudo, 2420 metres (7940 feet), bound the true Cordillera. The main way of communication of the two slopes is the deep transversal depression, to the south of Mounts Cox and Puntagudo, between the western arm of Nahuel-Huapi and the old eastern arm of Lake Todos los Santos, converted now into the bed of the river Peulla, fed by the glacier of Mount Tronador. This route was first frequented by the Jesuits in the colonial period; it is now utilised, and will eventually become one of the chief highways over the Andes in that region.



PUERTO BLEST IN LAKE NAHUEL-HUAPI.

Puerto Blest is the landing post of the western fjord of Nahuel-Huapi, and starting place of the road between Lake Llanquihue in Chile and Lake Nahuel-Huapi in Argentina. The road crosses the divisory line already agreed upon at the Raulies Gap (Argentine landmark No. 280), and near it is to be found the lower gap Perez Rosales (Argentine landmark No. 281), which is the last point accepted by the two Experts in that section of the frontier, and which is commanded by Mount Perez Rosales (Chilian landmark No. 272).

In Mount Tronador (Argentine landmark No. 282), the next difficulties in the tracing of the boundary commence. The Argentine Expert, considering as the main chain of the Cordillera the mountains west of Nahuel-Huapi, already

referred to, prolonged his line from Mount Perez Rosales—situated to the south of the gap of that name—to the snowy summit of Mount Tronador, 3400 metres (11,155 feet), which has always been held as a part of the boundary. The Chilean Expert, avoiding the huge glaciers of that important mountainous mass, and searching for the continental divide, proposed to trace the line to the east of the Tronador, passing by a gap (Chilian landmark No. 273), where rise the river Frio, an affluent of Lake Nahuel-Huapi, and another river, affluent of Lake Mascardi. This lake was formerly also a tributary of the Lake Nahuel-



MOUNT TRONADOR (3400 m.; 11,155 f.) AND THE RIVER PEULLA.  
Argentine landmark No. 282.

Huapi, but it is now abnormally tributary of the river Manso, and lies in Argentine territory, in the eastern slope of the Cordillera de los Andes.

When, in February 1893, Dr. Steffen and Señor Fischer scaled the cliff of the river Frio, and arrived at a gap between "two depressions" (1332 metres, 4370 feet above the sea-level), they reached, according to Dr. Steffen, the continental divide, and he says :

P. 151.—"Moreover, it is to be observed that the continental water-parting does not pass over the highest peaks of this block (Tronador), but rather over the ridge further to the east which is connected with the main mass of the said mountain, which divides the

snow-fields, having for their origin on one side the Peulla glacier, and on the other the River Frio glacier. Towards the east of the water-parting ridge is the steep depression of the River Frio Valley, on the other side of which a lofty Andean Cordillera runs from Nahuel-Huapi Lake towards the south. The pass between the Tronador block and the latter is a transverse ridge; we went around it from the north of the River Frio glacier climbing to its high platform (which we name Portezuelo Barras Arana), determining its height, 1332 metres (4370 feet). . . . The small plateau which extends to the higher point of the transverse ridge referred to is in parts covered with crippled *Raulies*, in parts with marshy meadows and small snow couches in which the waters flowing to the south have their sources. They lose themselves towards the south in a narrow ravine; further on they unite with the streams flowing from the hitherto unknown Tronador glacier, which descend in a S.S.E. direction, and are lost in a wide valley visible in the south, which apparently is full of marshy meadows, and on the south pass round the Tronador block; and which corresponds, perhaps, with the Peulla Valley in the north.

"From Barros Arana Gap, we ascended Cerro de la Constitución, 1857 metres (6094 feet), in the Cordillera bounding the River Frio Valley on the east, whence we could cast a glance over the still quite unexplored region towards the south-east. We next observed a plateau towards the south-east, on the Cordillera aforesaid, which contained a series of small lakes, forming a landscape greatly resembling the water-parting region at the foot of the 'Cerro Ocho de Febrero,' described above. Unfortunately, our time and means did not permit us to undertake the descent southwards, nor to make an exact study of the further course of the water-parting in this region, but so far as our observation from the said height extended, the water of the nearest and smallest of the three lakes which we could see, appears to flow into the streams flowing from the Portezuelo and from the Tronador glacier already mentioned, while the second and larger, shut in by steep walls, drains eastwards to the third and largest lake, the whole extent of which it was impossible to overlook on account of intervening hills. I do not venture to attempt the identification of this last lake with any of the lakes appearing on Argentine maps immediately to the south of Nahuel-Huapi. To commemorate the memorable journey of the Franciscan father, Francisco Menendez, the only traveller who, somewhat more than a hundred years ago, penetrated from the Chilian side into this wilderness to discover the famous Buriloche Pass, we named these lakes the 'Lagunitas del Padre Menendez,' and the before-mentioned valley to the south, the 'Valle de Buriloche,' on our map."\*

In the Spanish report of his journey,† Dr. Steffen gives fuller details concerning the country which he saw from Mount Constitución. He says :—

"It was very difficult for us to *definitely establish the course of the waters of this valley, called by us the Buriloche Valley*—as they were lost to sight on the east and west behind high hills. The trend of the chains of the Cordillera, and of the ravines which we observed to the south, seemed to indicate the existence of an outlet to the south-west; still, we did not completely relinquish the possibility that the valley we had seen was one of those

\* Petermann's *Mitteilungen*, 1894, p. 145. "Travel Sketches from the Cordilleras of Llanquihue."

† *Anales de la Universidad de Chile*, vol. 84, pp. 1208 and 1209. Santiago, 1893.

tributary valleys of Lake Nahuel-Huapi which appear on the sketch of Señor Rohde's Expedition (1883).

"Further on, to the south of the large valley which we have just described, appears a chaos of isolated cordons and mounts, among which looms out one of a perfect cone shape, bare of any kind of vegetation, and brown in colour. Between these cordons there are numerous ravines the prevailing trend of which is south-west. The southern horizon is bounded by innumerable snow-peaks of the most fanciful shape, like castle towers, church domes, pyramids, &c.

"The eastern border of the canyon, through which the above-mentioned glacier finds an outlet, bounds a high plateau on which we saw two small lakes, and part of a larger one, which, in memory of the intrepid traveller who surveyed these regions more than one hundred years ago, we named, 'the Father Menendez small lakes.' The smallest, which is the most westerly, resembles in character the lakes with which we are already acquainted, in the region of the *divortium aquarum*, near Mounts '8 and 12 de Febrero,' its outlet being towards the canyon. The second—shut in between heights of greater altitude, the southern border of which looks like a perpendicular wall—probably communicates by means of an outlet with the third lake, which we could see only in part, its continuation to the north-east being hidden behind the mountains. This also is enclosed between rocky mountains, almost entirely bare, and the dark green colour of its waters is very similar to that observed in the small lakes Guanaco and Cántaro."

Señor Fischer, in a lecture delivered at Santiago,\* expresses the opinion that the Barros Arana Pass forms an important divide between the waters which flow to the river Frio, in the basin of the Nahuel-Huapi, and those which flow to the river Blanco. He adds that he and his fellow travellers noted the existence of a broad and open valley to the south of the Tronador, which they called the Valley of Buriloche; that they were unable to determine to which fluvial basin it belonged; and that they perceived the lagoons which Father Menendez mentions.

In another excursion, in the same year, Señor Fischer explored the so-called Buriloche Valley, which he says extends further to the east of the southern part of Tronador, and consequently receives the waters of the Barros Arana Pass. He could not see the whole of its extent, as his view was obstructed by the Cerro del Diablo, which had been reached by Señor Valverde, who considered it impossible to cross the Andes in this region, to the north of 41° 30' S. lat., so great is the ruggedness of the snow-capped range. It seems that the only explorer who succeeded in that crossing was Mr. Christie, who did so by ascending the Rio Cochamó as far as its eastern source.

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\* El Paso de Vuriloche, Santiago de Chile, 1894.



These quotations from Dr. Steffen and Señor Fischer show their errors upon a most important geographical point : it appears as if they had been deceived by the sublimity of the scenery, and the snow-capped mountains. The continental divide occurring in the Barros Arana Pass is not produced in the manner they state, since the streams from snow-drifts they mention do not flow into what they consider as being the Valley of Buriloche, but to Lake Mascardi in the eastern slope of the Cordillera de los Andes. The so-called Buriloche Valley does not extend so far as to the east of Barros Arana Gap, being bounded by the snowy ridges to the south of Mount Tronador. It seems that at the end of last century Father Menendez crossed somewhat more to the north of the Pass of the River Cochamó : there is no doubt that the glacier he alludes to does not descend from the Tronador, but from the ridge "Cerro Largo Nevado" of the Argentine map, and probably the lake he saw is the one which in the same map bears the name Vidal Gormaz, and which drains to the east.

The proposed Argentine line starts, as has been said, from Perez Rosales Pass (No. 281), crosses over the highest summit of Mount Tronador, 3400 metres (11,155 feet), follows along the crests of the chain of snowy mountains which run southwards from Mount Tronador, and which are steep and impassable, except through a gap of difficult access, of about 1500 metres (4921 feet) in altitude, and reaches the real Gap of Bariloche.

This chain divides the waters of the rivers which empty, to the west, into Lake Todos los Santos and into the Reloncavi Inlet (from the river Cochamó to the north) from the waters feeding the affluents of the series of eastern lakes of the old fjord of Nahuel-Huapi, and it will be difficult to find a frontier line in that region more suited to be such by its orographical character.

The climatic conditions of the country to the south of the Tronador, at the time of their investigations, have prevented the Argentine surveyors from measuring the height of all the snow-capped peaks which *form the main chain of the Cordillera* in this zone, and they have only obtained the altitude of those near the eastern valley, but doubtless there are summits of 2500 metres (8202 feet) high at least.

The Pass of Bariloche (Argentine landmark No. 284), 1034 metres (3392 feet) above the sea, is commanded to the north by mountains of 1740 metres (5709 feet) and 1550 metres (5085 feet) high, and to the south by one of 2034 metres (6673 feet). Lake Christie, to the west of the Pass, is 877 metres (2878 feet), and Lake Felipe, to the east, is 730 metres (2395 feet) high.

To the south of the pass, the lofty snow-covered chain follows, always in a southerly direction. Its lowest pass is covered with snow only in winter, according to the statements of the last Chilian explorers, while others are permanently covered, and it may, therefore, be stated without rashness that the mean height of the ridge cannot be under 2000 metres (6562 feet). It suddenly becomes lower to give passage to the upper part of the river Manso which, in comparatively recent times, has received the waters of the eastern slope of the main chain of the Cordillera, which originally flowed into the old branches of the Lake



BARILOCHE GAP FROM SOUTH-WEST TO NORTH-EAST, AND LAKE CHRISTIE.

Nahuel-Huapi which empty eastwards. The line of the Argentine Expert passes along the crest of the said ridge, and bears number 285 at the narrow gorge of the river Manso, where the said line cuts that river.

The illustrations which accompany this chapter are sufficient to show the general features of the Cordillera in its eastern slope, and also the parallel ridges of the Pre-Cordillera which bound it to the east. Lake Nahuel-Huapi (Plate LX.) is a typical example of the great lakes to be met with in these latitudes. To the west rise the high mountains into which it penetrates through deep fjords, which are secondary lakes, and which have become isolated branches

*E.N.W.*

*Patagonian Tableland.*

*Puerto Moreno.*

*Lake Gutierrez.*

*Block of Mount Cathedral.*

*Western Fjord.*

*N Isla Grande.*



PANORAMA OF LAKE NAHUEL-HUAPI FROM PENINSULA DE SAN PEDRO.





of the great lake, owing to alluvial deposits. To the east is the characteristic and monotonous Patagonian tableland, extending from the very foot of the Pre-Cordillera. Plate LXI. represents the main chain to the west of Mount Catedral, from the south of Mount Tronador to the Bariloche gap where the pass of that name crosses. It is along that ridge, as it has been said, that the Argentine line runs. In the figures here inserted are seen the Gap, or Pass, of



BARILOCHE GAP FROM THE EAST, AND LAKE FELIPE.

Bariloche, from the south-west, with Lake Christie, and the same Gap from the east, with Lake Felipe. To the south of this the prolongation of the snowy range above-mentioned is clearly represented.

The frontier agreed to in 1881 may be said to be the best natural frontier with the exception of that formed by the sea, but it would be the worst, if the views of the Chilian Expert were adopted. The comparison between both lines proves the exactness of this assertion.

The line of the Chilian Expert, from Mount Perez Rosales—situated at the foot of Mount Tronador—continues until Barros Arana Gap, a point to the east

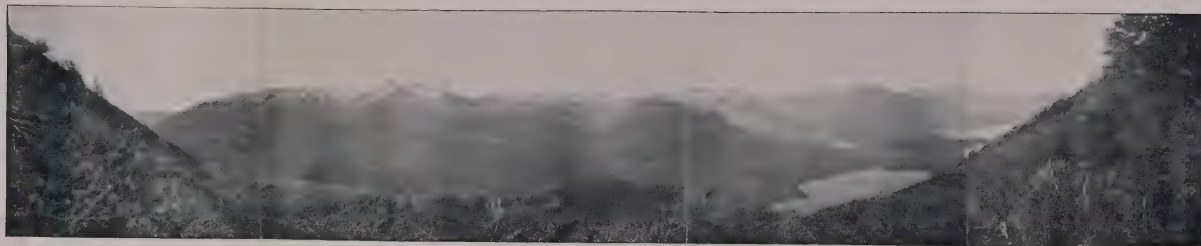
of the main chain of the Cordillera that separates the sources of the river Frio, an affluent of Laguna Fria, which empties into Lake Nahuel-Huapi, from the waters that, flowing towards the south and south-east, fill the lakes of the ancient fjords of the said Nahuel-Huapi.

From that Gap the Chilian line ascends to the summit of Mount Constitución, which dominates three fjords of the great lake which are that of Laguna Fria, that formed by the opening to the south of the western extremity of the San



NORTHERN PART OF LAKE MASCARDI AND MOUNT TRONADOR.

Pedro Peninsula, and lastly the main one, now partially filled up, which will be described hereafter. From Mount Constitución the line passes to Mount Catedral, which is surrounded to the north by Lake Nahuel-Huapi, and to the east and south by the secondary lakes of Gutierrez and Mascardi, Mount Catedral being connected with the main chain by the extreme end of Mount Constitución. It then descends to the swamp which the Chilian Expert calls the *Pass* Mascardi, and ascending Mount Tristeza, follows towards the south the abnormal continental divide along the mesozoic ridges, which are



LAKE VIDAL GORMAZ AND THE MAIN CHAIN OF THE ANDES TO THE WEST OF MOUNT CATEDRAL.





independent of the Cordillera de los Andes, properly so-called, thus assigning to Chile the whole of the waters that now discharge into the Pacific Ocean through the river Manso, notwithstanding the fact that some belong to the eastern slope of the Cordillera, and others proceed from points outside the said Cordillera.

This region, lying between the crest of the main chain of the Cordillera and the present continental divide, must be divided, for the sake of clearer description, into two sections, although they are intimately connected.



WESTERN PART OF LAKE MASCARDI.

1. *The Northern Section* is formed by an ancient fjord of Lake Nahuel-Huapi, now partially filled up with alluvial and glacial detritus.

This old fjord is commanded on the north by the block of Mounts Catedral, 2380 metres (7809 feet), and by the mountains which run from this block as far as the main chain of the Cordillera. From Lake Nahuel-Huapi, the fjord proceeds to the south-west, and severs into three branches in the centre of Lake Mascardi. The branch to the south, at the present time, forms Lake

Guillermo, separated from Lake Mascardi by the remains of a fluvio-glacial plain which is cut by the outlet of the former. The branch to the north forms the northern portion of Lake Mascardi, and extends into a narrow and lengthy valley bearing towards the north-west, and then turning suddenly to the north; this valley is the one seen from the height of Mount Constitución by Dr. Steffen and Señor Fischer, who add that across it a river descended to the south, referring perhaps to the river which flows into the lake. (The



LAKE VIDAL GORMAZ FROM THE NORTH, SHOWING IN THE  
DISTANCE THE MAIN CHAIN OF THE ANDES.

illustration on page 749 represents a view of the scenery in that direction). The third branch runs to the west, into a valley of alluvial and glacial remains, which receives the overflow of the Lakes Vidal Gormaz, Fonk and Hess, and the western part of Lake Mascardi.

To the south of the depression which contains Lakes Fonk and Hess, and between Lakes Vidal Gormaz and Mascardi, there is a valley of some extent, which ends to the south in a gorge of very recent formation, where

now run, at the foot of the Gormaz ridge, the waters of these lacustrine series, with the exception of those of Lake Gutierrez. These waters descend, forming cascades, through the narrow gorge dominated by mountains of 1860 metres (6102 feet) in altitude to the east (Cerro Partido), and 1725 metres (5660 feet) to the west, at the Gormaz ridge.

It has been said that Lake Felipe, at the foot of the top edge of the main chain, is situated at an altitude of 730 metres (2395 feet): the height of Lake Vidal Gormaz is 725 metres (2379 feet), and the northern terrace



LAKE HESS AND MOUNT TRONADOR.

of the Lake—the remainder of its old extension—is 815 metres (2674 feet) above the level of the sea. It is unnecessary to further describe the scenery, as the illustration opposite is a good representation of the Lake Vidal Gormaz, showing the main chain in the distance, and nearer, a volcanic table hill.

A ridge of 1650 metres (5413 feet) separates Lake Felipe from the depression of the Lakes Hess, 724 metres (2375 feet), and Fonk, 730 metres (2395 feet). The photograph of Lake Hess, given above, shows Mount Tronador to the north-west and the hills surrounding the lake, which are

outside the main chain. In the south of the Gormaz ridge a height of 1685 metres (5528 feet) has been determined, but it contains much higher crests, which it was not possible to measure. The waters running from the west unite near the outlet of Lake Vidal Gormaz with those running from the east, and the watercourse thus formed turns to the south-west, in the valley of some extent already mentioned, and enters its southern gorge in Tres Cascadas, at 690 metres (2264 feet) above the level of the sea.



SWAMPS BETWEEN LAKES MASCARDI AND HESS.

In the centre of the swampy plains where the outlet of Lake Mascardi runs the height is 775 metres (2543 feet); Lake Mascardi is 766 metres (2513 feet) in altitude; the alluvial plain between Lakes Mascardi and Gutierrez is 807 metres (2648 feet); Lake Gutierrez is 781 metres (2562 feet); and Lake Nahuel-Huapi is 740 metres (2428 feet). This series of heights confirms what has been said as to the former occupation of these fjords by the waters of Lake Nahuel-Huapi.

In times previous to the latter stage of the glacial period, Lake Nahuel-Huapi possibly occupied an area twice as large as that which it covers at



present, and it was formed, besides the lakes already mentioned, by the Correntoso and Espejo Lakes, now situated at its north-west end. When the ice advanced it covered up this immense hollow to a height of 300 metres (984 feet) above the present level of the great lake, and carried with it the large quantities of erratic boulders and the moraines which are to be seen in the valleys and on the flanks of the mountain. Great rivers, proceeding from the snow-drifts, deposited the gravels which form the plains that surround the present lake, and there were consequently called into existence several fluvio-glacial terraces. A subsequent glaciation deposited to the south of San Carlos a series of moraines which rise to a height of a hundred metres (328 feet) above the terraces, which, in their turn, are situated 30 and 40 metres (98 and 131 feet) above the lake. The sketch here inserted exhibits these features and speaks for itself. The old arm formerly communicating with that which is now occupied by the series of lakes from Lake Gutierrez to Lake Felipe, has been closed by these glacial deposits.

The narrow passage between Lake Gutierrez and Puerto Moreno in Nahuel-Huapi has likewise been interrupted at the north-western angle of Lake Gutierrez by a small semi-circular moraine, and also by two alluvial cones formed by materials brought from the two lakes, but the river Gutierrez has cut through that barrier, so that Lake Gutierrez flows into Nahuel-Huapi. Lake Gutierrez belongs, therefore, to the class of lakes formed by moraines and lateral alluvial fans.\* To the south of Lake Gutierrez, between it and Lake Mascardi—and only 60 metres (197 feet) above the level of Lake Nahuel-Huapi—is to be found the continuation of the same general terrace, which is merely a flat valley rising 24 metres (79 feet) above the two lakes. Two alluvial cones of considerable size, which have come down from the north and south, and met in the centre of the valley, have caused the separation of the two lakes, which were formerly only one. (Plate LXII.) The waters of Lake Mascardi, forced to seek another outlet, found it in the gorge already mentioned at the foot of the Gormaz ridge. The terraces previously referred to appear again between Lakes Mascardi and Vidal Gormaz, and to the north of the latter, where they attain a height of 830 metres (2723 feet) above the level of the sea, being 95 metres (312 feet) higher than those of Lake Hess, which is emptying as the erosion deepens its outlet.

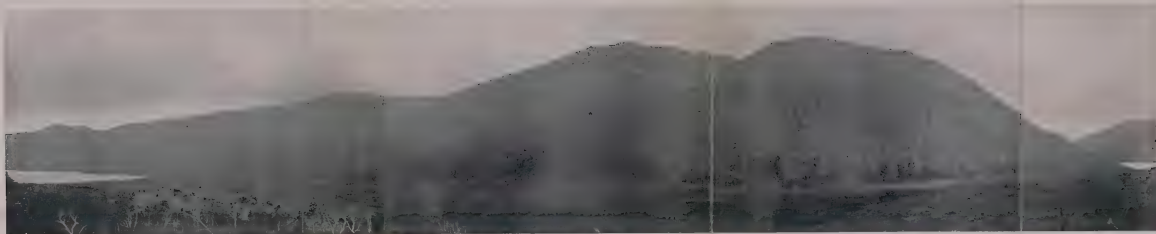
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\* A few months ago landslides have taken place, descending from Mount Catedral and Mount Tristeza, and have reached as far as Lake Gutierrez.

The Missionaries who during the colonial period traversed those regions probably passed during the summer season through this series of lakes, the



SKETCH OF THE REGION BETWEEN LAKES MASCARDI AND NAHUEL-HUAPI.



*Lake Gutierrez.*

THE ALLUVIAL FAN BETWEEN LAKES GUTIERREZ AND MASCARDI.

*Lake Mascardi.*  
[Face p. 738.]





present Argentine Expert having found on the banks of Lake Gutierrez, in 1880, some wood worked by man, as if it had been used for making rafts, and also some stones piled up, as if for a landing-place. It is worthy of attention that the Missionaries, who were careful observers, made no mention in their writings of the low dam existing between the lakes which they met after climbing the Pass of Cochamó or Bariloche, nor did they say that those lakes, especially Lake Masecardi, drained towards the west. In view of this silence, of the recent break of the gorge forming the present outlet between the Gormaz ridge and Cerro Partido, of the evidence in the same gorge of recent volcanic action, and of similar manifestations observed in the whole region to the west and east of the main chain, it may surely be presumed that the alteration in the drainage is by no means of ancient date, and it may be said that such a change does not modify the general rule of the normal drainage of the eastern slope of the Cordillera, since it is easy to perceive the regular inclination of the alluvial material that fills up the valleys, clearly and unmistakably indicating the direction of the waters that transported and deposited it.\* It is, therefore, very probable that the modification in the drainage is due to one of those phenomena so common in the Cordillera de los Andes, and which the Chilian Expert himself has pointed out.†

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\* This case of abnormal continental divide caused by an alluvial fan to the east of the Cordillera has some analogy with that occurring in Yellowstone Park. There Two-Ocean Creek has built a fan that forms a part of the continental divide in North America. "Sometimes the stream flows on an eastern radius that leads it to Atlantic Creek (Missouri-Mississippi system); sometimes on a western radius, to Pacific Creek (Columbia system)." Morris Davis, *Physical Geography*, Boston, U.S.A., and London, 1899, p. 277.

† Señor Barros Arana, in his *Geografía Física*, not only enumerated, amongst the phenomena caused by volcanic action in the Cordillera de los Andes, landslides from mountains and formation of lakes owing to obstructions to a river (p. 379, Ed. of 1881), but likewise "more or less considerable openings in the earth." He quotes the case, during the earthquake of December 16, 1575, of a landslip "from a mount which, falling into the River Calle-Calle, at the part where it takes its source from Lake Riñihue, formed a dam which obstructed the flow of the waters, until, in April of the following year, the volume of the lake being augmented by the rains, it broke at midnight through the barrier which kept them back, and caused the most terrible ravages throughout the whole of the surrounding country." It is not out of place to remark that this accident occurred close to the Cordillera de Ipela, and that it is not difficult to conclude that volcanic action has contributed to form the breach of Huahum in comparatively recent times, altering the direction of the system of the waters on the Eastern slope of the Cordillera, and causing Lake Lacar to change its outlet to the West.

The whole southern region has undergone alterations during historic times from the effect of volcanoes. There is no doubt that in recent times Lake Llanquihue extended as far as the confines of the present Lake Todos los Santos, forming thus one sheet of water, and that it was separated by the volcanic action of the Osorno and the Calbuco volcanoes. The volcanic sands that come down from the Osorno, now forming the isthmus dividing the two lakes, are of very recent date, and the same is also the case with the breach through which the torrential Petrohue rushes. There are even to be seen remains of woods imbedded beneath the waters of Lake Todos los Santos, a proof of these waters having been at a lower level; and upon the smaller islands in its centre, discovery has been made of implements of human industry, where it would

It is therefore absurd to pretend that the main chain of the Andes is to be found between Mounts Catedral and Tristeza, and that the swampy pool situated between Lakes Mascardi and Gutierrez forms the lofty summit of the Cordillera.

Even though the Chilean maps already quoted depict a ridge of mountains between those two lakes, in order to attempt to justify the frontier line suggested by the Chilean Expert, the real configuration of the region is quite different.

Dr. Steffen, in the Report of his Journey to the Rivers Puelo and Manso (Santiago, 1897), has published a sketch of the country to the south of Nahuel-Huapi made by the 7th Chilean Boundary Sub-Commission (reproduced in Plate LXIII.), which, though it shows the true features of the isthmus between Lakes Mascardi and Gutierrez, represents the whole region in a very different manner than the same is shown in the Argentine map. This confusion of data once more reveals the necessity of the previous survey established by the Treaties, since, without an accurate knowledge of the ground, the settlement in a satisfactory way of the boundary difficulties would be an impossible task. That confusion is so great that in the map of the Chilean Sub-Commission the Cordillera does not appear.

Nevertheless, in presence of the facts here mentioned, and of the photographs that have been reproduced, is it possible to claim *that the crest of the Cordillera de los Andes, i.e. the main chain, is situated in the fjord of Nahuel-Huapi, in the swamp between Lakes Mascardi and Gutierrez?* Can the alluvial fan between those lakes be considered as the summit of the Andes? Is it possible to deny that *the snowy chain covered with glaciers forms that crest of the Cordillera?* Can there be a better frontier than this mountain chain, which is practically impossible to cross, according to Chilean explorers themselves, and which has only two depressions, one of 1,500 metres (4921 feet) and another of 1034 metres (3392 feet)? Is this natural frontier to be abandoned for one contrary to all reason, like that proposed by the Chilean Expert?

The Chilean jurisdiction *in the middle of the interlacustrine ground of Mascardi and Gutierrez*, would be always a political mistake, whilst the frontier in Gap of Cochamó—the scientific watershed of the main chain of the

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not now be imagined that they could have existed. In the inlet of Reloncavi are to be observed recent hollows and upheavals due to the same causes, and large tracts are covered by black volcanic sands descending from the interior of the mountains, which have been considered by some persons to be great roads made by the problematical "Césares" inhabitants of the region.



SKETCH OF THE REGION WHERE RIVER MANSO TAKES ITS RISE, BY THE 7TH CHILIAN BOUNDARY SUB-COMMISSION, SANTIAGO, 1898.





Cordillera—is the best natural boundary, as it will be, doubtless, confirmed by the Surveyors to be sent by Her Britannic Majesty's Government.

2. *The Southern Section* is formed by the continuation of the longitudinal depression where the principal affluents of the river Manso meet, eastward of the main chain of the Cordillera. In order to pass from the old fjord of Nahuel-Huapi to this part of the depression, the waters of the series of lakes just mentioned penetrate into the gorge of Tres Cascadas, commanded to the



MOUNTS PARTIDO AND FUERTE, FROM THE SOUTH OF THE  
OUTLET OF LAKE VIDAL GORMAZ.

east by Mounts Cascadas, Partido and Fuerte, and to the west by the Vidal Gormaz Ridge, a gorge which becomes narrower towards the south, being there enclosed between steep rocky sides, opens afterwards through a transversal depression which begins at the Vidal Gormaz Ridge, and then loses itself in the great tectonic eastern Andean longitudinal depression. This transversal valley contains Lakes Martin and Steffen, through which the waters brought from the north across the gorge find an outlet, and their alluvia has formed the cone separating the two lakes.

These two lakes, before the opening of the gorge, formed a single lake. They are bounded on the north-east by Mount Fuerte, 1740 metres (5909 feet), to the north-west and west by the snowy Gormaz ridge, and on the south by a transversal ridge, the highest peaks of which, Bastion and Santa Helena, measure about 2000 metres (6562 feet). At the eastern foot of this latter mountain is to be found the outlet of the lakes, which by another narrow gorge, runs to the southern valley, and there receives from the east the



THE RIVER MANSO AND THE VIVORAS STREAM—S.S.W. OF MOUNT VENTISQUERO  
IN THE MAIN CHAIN.

river Villegas, rising in a ridge which is parallel to the Cordillera de los Andes, and which must be considered as the southern prolongation of the Pre-Cordillera. This ridge is constituted by mesozoic folded layers, and starts from the south of San Carlos of Nahuel-Huapi, attaining 2000 metres (6562 feet) at its culminating point. The eastern source of the river Villegas is situated at an altitude of 1160 metres (3806 feet), in a meadow where the river Curruleufu, a tributary of the river Limay, running to the east, also rises. The geological character of this ridge distinguishes it from the Cordillera de los Andes.

To the east of this southern valley there rises a mountain of 1840 metres (6037 feet) which extends to the south, forming Mount Serrucho (Saw), a name given by the Argentine Surveyors on account of its teeth-like indentations. At its foot flows a stream which runs to the north-west, and afterwards bends to the west, penetrating another transversal valley, called Valle de los Humos by Dr. Steffen, and leaving between the river Manso and the said valley the Mount Foyel, 1690 metres (5545 feet).



THE RIVER MANSO, TOWARDS THE NORTH-WEST, AND MOUNTS QUEMADO  
AND SANTA HELENA.

The river Manso, formed by the waters of the northern lakes and of the river Villegas, does not penetrate into the longitudinal great valley, which is known as "Corral de Foyel" (Foyel's Paddock) on account of its having been the scene of the wild-bull hunts of the Patagonian Indian of that name, chief of the tribes under Argentine dominion, who occupied the surrounding regions until these were settled with prosperous Argentine cattle farms. That river receives, nevertheless, the waters of the northern part of the "Corral de Foyel,"

which has an altitude of 480 metres (1575 feet), (those of the south being collected by the river Foyel); it bends sharply to the west for more than twenty miles, and again turns to the north at the end of the Valle de los Humos; it is there joined by the river Foyel, which, before turning, receives the waters of Lake Escondido, fed by the snowy main chain bounding the longitudinal depression to the west. All this great mass of water formerly flowed to the Atlantic, but the river Manso, through one of the weaker places of the main



THE RIVER MANSO AND MOUNT VENTISQUERO (2100-me.; 6890 f.),  
IN THE MAIN CHAIN.

chain, has captured it gradually, and now those waters form the upper course of the river, which, after running for some distance to the north, turns to the west, cuts the main chain of the Cordillera de los Andes by a narrow gorge, and again follows a S.S.W. course, until it flows into the River Puelo, on the Chilian side of the Cordillera.

The dividing line of the Argentine Expert crosses this narrow gorge (No. 285) —where, according to Dr. Steffen, the inaccessible part of the river Manso exists—and then follows to the south along the crest of the snowy chain which divides the waters that



*fall into the great longitudinal valley of the east, from those that fall into that part of the river Manso which lies to the west.*

The panorama represented in Plate LXIV. is taken at an altitude of 2000 metres (6562 feet), on Mount Colorado, which is situated in the Pre-Cordillera, directly to the south of the outflow of Lake Nahuel-Huapi into the river Limay : it shows very clearly the chains of that region with their principal summits. To the north are to be seen the ridges situated to the east of the lacus-



THE RIVER MANSO IN THE NARROWS.

trine series between Lakes Lacar and Nahuel-Huapi; then this great lake, the ridge the culminating point of which is Mount Tristeza; the ridge of Mount Catedral, behind which rises the Tronador; and lastly, the prolongation of the main chain to the south of Tronador. Between Mount Tronador and the Bariloche Pass, the Vidal Gormaz ridge is hidden by the outer ridges of the Cordillera, but further south it may be seen quite clearly, stretching to the west of Mount Foyel. Immediately in front of Mount Foyel lies the depression through which the river Villegas flows, and where are to be found its sources and those of the

river Curreuleufu, both on the continental divide to the east of the Cordillera de los Andes, and in the Pre-Cordillera. The formation of this Pre-Cordillera corresponds to that of the mountainous regions of the Argentine Provinces of San Juan and Mendoza, there called Sierra del Tontal and Paramillo de Uspallata, and which, as has been stated—recalling amongst others the opinion of Darwin, Burmeister and Brackebusch—were never considered as forming a part of the Cordillera de los Andes.

The illustration on page 759 represents that part of the longitudinal valley in which the river Manso, uniting with the river Villegas, flows towards the west, dominated by Mount Santa Helena and Mount Quemado. The next photograph was taken from a point rather more to the north than the previous one, and in it appears Mount Ventisquero, 2100 metres (6890 feet), which is situated in the mountainous mass that, according to Dr. Steffen, may be considered as being the main chain of the Cordillera, and over the summit of which the Argentine Expert causes the boundary line to pass, after cutting the narrow part of the river Manso. The other photograph of river Manso was taken at a point near the great bend of that river, where it changes its direction to the north, turning afterwards to the S.S.W., and penetrating the abrupt narrow gorge across which the Argentine line runs.

## 2. DIFFERENCES FROM THE GORGE OF RIVER MANSO TO THE GORGE OF RIVER PUELO.

The eastern longitudinal depression to which reference has been made, and which extends to the north of the bend of the river Manso and of the river Villegas, continues also to the south as far as the high grounds of Tres Picos, an eastern spur of the Cordillera, 2400 metres (7874 feet) in altitude.

This depression was formerly the bed of one of the arms of the glacier which filled the whole eastern longitudinal depression, and which transported the enormous blocks of granite that, during the first ice period, reached as far as half-way down the slope of the volcanic ridge forming the Puerta de Apichig.

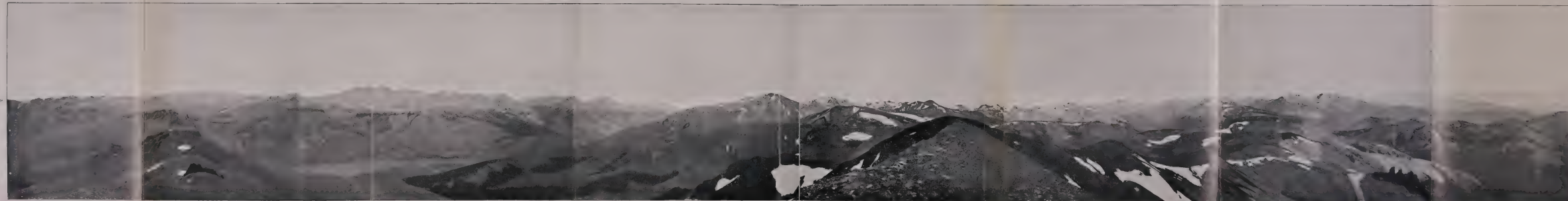
The Serrucho and Piltriquitron mountains, which bound the depression to the east, correspond in this latitude, just as Mount Colorado does further north to the "Sierra" or chain of Uspallata, i.e. the Pre-Cordillera de los Andes

*River Villegas*

*Gurmea Ridge.*

*Mount Tronador*  
*Mount Omeo.* (3400 m.; 11,155 f.).

*Ridge to the North of Nahuel Huapi.*



*Continental Divide.*

*Cerro de Fogel.*

PANORAMA TAKEN FROM THE SUMMIT OF MOUNT COLORADO (2,000 m.; 6,562 f.), IN THE PRE-CORDILLERA.





already mentioned, although the mountains are here much less important than those of the north, as they only form a single ridge, which is, besides, of less extension in its axis.

On the west of the longitudinal valley rises the Cordillera de los Andes; and the most eastern mountains of the main ridge attain a height of 2350 metres (7710 feet), abounding in snow-capped peaks [and glaciers. Their waters flow down into the valley, through the centre of which run the two arms of the river Quemquemtrey, separated by vast glacial deposits, which in the neighbourhood of Corral de Foyel measure 930 metres (3051 feet) above the sea.

The mountainous region along which, owing to its orographical conditions, the boundary line must be traced, viz., *the main chain of the Cordillera*, is situated to the west of the longitudinal depression called "Valle Nuevo," which is undoubtedly Argentine. Dr. Steffen, who, by order of the Chilian Boundary Commission, partly surveyed this region in 1895 and 1896, holds this same opinion in regard to the main chain, since he refers to the *main chain*, as understood by the Argentines, as being the imposing barrier of the "Cordon de la Sierra Nevada." He says :—\*

P. 55.—"To the north of this basin continues the said *chain of high peaks*, with an approximately southern trend, and it appears as a series of imposing snow-covered masses, upon which glaciers are formed; this series is broken by deep gorges, but it constitutes as a whole a continuous central chain, which may be recognised, if one chooses to call it so, as the principal chain of the Cordillera."

Dr. Steffen adds that *certainly this main chain is not the "chain which divides the waters, that is, the one which the Boundary Treaties fix as a guide, etc."* In these words he alludes to that pretended chain of the continental divide maintained by his chief, the Chilian Expert; but *as the chain to which the Treaties refer is the "main chain of the Andes,"* and since the continental divide is found to the south of 40° S. lat., sometimes in lateral ridges independent of the Cordillera de los Andes, and sometimes in the eastern plains, the main chain which divides the waters specified in those Treaties is no other than that which according to Dr. Steffen, constitutes as a whole a continuous central chain, which is the one that extends from the ridge of Ipela to the Cordillera Sarmiento (from 40° to 52° S. lat).

The main chain between the northern bend of the river Manso and the narrow part of the river Puelo, is an impassable barrier. Its crest attains

\* Zeitschrift der Gesellschaft für Erdkunde zu Berlin, 1897, vol. 32.

2500 metres (9202 feet) or more, and its ravines are blocked up by glaciers, constituting the actual separation between the rainy region peculiar to the Pacific, and the mild zone to be met with before reaching the dry plains of Patagonia. The Argentine Expert has carried his line over this snowy crest dividing the waters of the central chain of the Cordillera, crossing the river Manso, at the narrow part already mentioned, and continuing until it also cuts the gorge, where the river Puelo, in its course toward the west, becomes an immense series of rapids and cascades.\* Whenever the *main chain of the Cordillera*



LAKE INFERIOR OF RIVER PUELO, TO THE WEST.

is cut by rivers having part of their sources to the west of the range, there occur deep narrow gorges, with rapids and cascades, and these are the places over which the Argentine line is made to pass. The two figures of Plate LXV. are reproductions of photographs by Dr. Steffen, and show the configuration of the country in the neighbourhood of the river Puelo, the broad eastern longitudinal depression or Valle Nuevo, and the main chain of the Andes which bounds this

\* See Dr. Hans Steffen's Exploration of the River Puelo, in Petermann's Mittheilungen, 1895.

FIG. 1.



THE VALLE NUEVO. VIEW TOWARD THE NORTH.

Reproduction of Plate IV. from "Viajes y estudios en la Región Hidrográfica del Río Puelo," by Dr. Juan Steffen, Santiago, 1898.

FIG. 2.



SNOWY MOUNTAIN MASSIVES WHICH BOUND VALLE NUEVO TOWARD THE WEST.

Reproduction of Plate VII. from "Viajes y estudios en la Región Hidrográfica del Río Puelo," by Dr. Juan Steffen, Santiago, 1898.





depression to the west. The illustration in the text shows the Lake Inferior of the Lake Puelo, east of the Angostura, or boundary-narrow, and also the snowy ridge of the west. Lastly, Plate LXVI. represents the outlet of Lake Puelo and the main chain of the Andes to the west of it.

Dr. Steffen concludes his article on the river Puelo, just quoted, as follows :—

“The view from the top of the water-parting, Boquete, shows with marvellous distinctness the deep depression of the Valle Nuevo to the west, and *behind it the imposing lines of the central snowy mass, with their numerous sloping glaciers, pierced by narrow and deep ravines*, trending away from north to south, apparently without end. A colonist from Maiten told me that, *about a day's journey to the north of the Colonia del Valle Nuevo, the Cordillera was cut by an enormous depression to the west*, in which had been observed a river emptying into a larger river to the south—doubtless the Puelo, of the existence of which Argentina had, of course, no precise knowledge. In my opinion this statement can refer only to an affluent of the Puelo *cutting the central mass*, probably the river Manso. Issuing from a great cleft of the valley in the E.N.E., and carrying a body of water about equal to that of the main current, the river Manso discharges its waters into the Puelo, 6 kilometres ( $3\frac{3}{4}$  miles) above the Taguatagua Lake. With its arrival at the water-parting, the expedition had reached its goal.”

The water-parting to which Dr. Steffen refers *is not the watershed of the Cordillera de los Andes, but the continental divide in lateral and independent mountains, hills and plains*. The scientific watershed along which the Argentine line runs, is, as has been said, *that of the central mass, or main chain, which Dr. Steffen accurately describes, with snowy masses and glaciers to the west of the valley*.

Between the gaps of Perez Rosales and the river Puelo, the Cordillera de los Andes is perfectly well characterised, and its eastern slope is entirely free from any spurs that might lead to confusion in the tracing of its outlines. The longitudinal depression which contains the Valleys Nuevo or Grande, Foyel, Guillermo, Mascardi and Gutierrez, seems to extend further north to the neighbourhood of Lake Lacar, through Lakes Correntoso and Espejo, and the hollows of western Traful and Caleufu, as a result of the tectonic depression parallel to the Cordillera, which is also prolonged to the south through the lacustrine eastern depression of the system of the river Fetaleufu. These depressions between the Cordillera and the eastern independent ridges will be graphically represented further on, and they will afford a new proof that the Argentine proposed boundary line is the true one in accordance with the stipulations made between the Argentine Republic and Chile.

Plate LXVII. contains a panorama taken from a point near to the north of the Apichig opening, and it represents the bed of part of the former pre-glacial lake, crossed now by the northern arm of the Chubut river, at present known as the river Maiten, and formerly as the river Quelujaguetre, from the name of an encampment of Gennaken tribes which have now disappeared. This panorama shows first the western slope of the small ridge of Apichig, then the northern valley through which the Chubut river descends, and wherein the river Villegas—an affluent of the river Manso—takes its rise in the vicinity of the “Valle Nuevo,” and lastly the main chain of the Andes to the west, preceded by the prolongation of the Serrucho ridge. The opening of La Ternera or El Repollo, which connects Valle Nuevo with Valle Maiten, and, behind the latter, the gorge through which Lake Puelo empties, are also clearly seen; and to the south of the former, Mount Piltriquitron, at the southern foot of which the river Maiten flows towards the plain of Caquel Huincul; to the east of the river is the continuation of the hills of Apichig. In presence of this panorama it is impossible to maintain that the broken ridge of Serrucho and Piltriquitron is the main chain of the Cordillera de los Andes, or to deny that this main chain is constituted by the snowy range which is seen to the west, and which is considered as such even by the Chilian explorers themselves.

It may also be remarked that the opinion of the said explorers does not coincide with that of the Chilian Expert. Señor Barros Arana, although not personally acquainted with any other point in the Cordillera de los Andes than the road of Uspallata, pretends that the line of the high summits of the Cordillera, the main chain of the Andes, is to be found in the continental divide, whilst those who have examined the ground when serving in the Boundary Commission, of which Señor Barros Arana himself was the head, consider as the main chain of the Andes the real central chain, and confess that the continental divide is found to be either in lateral chains or in the undulating plains to the east of the Cordillera. The Chilian explorers admit that to the east of the compact mass of the Andes there are lands with broad valleys, partially occupied by lakes, which discharge to the Pacific, across water gaps in the Cordillera, one of these large valleys being the Valle Nuevo. The climatic and the orographical conditions of the region show that this valley is at the eastern foot of the Cordillera. The continental water-parting occurs, therefore, according to these explorers, at least to the east of the main chain, and consequently those lands with broad valleys must be considered as being Argentine territory.



OUTLET OF LAKE PUELO AND MAIN CHAIN OF THE ANDES.





*Apach / Opening*

*Mount Fitz-Roy*  
(2900 m.; 9512 f.).

*Opening of the Toreros*  
(1885 m.; 6184 f.).

*Peak Spire of Mt. Mañá Chola*  
(2500 m.; 8202 f.).

*Serrucho Ridge*  
(1150 m.; 3773 f.).



*River Mañá or Chola (750 m.; 2460 f.).*

PANORAMA TAKEN FROM THE NORTH OF THE APACHIO OPENING, SHOWING THE SMALL RIDGE OF APACHIO, THE VALLEY FROM WHERE DESCEND RIVERS MATEN AND VILLEGAS, AND TO THE WEST THE MAIN CHAIN OF THE ANDES, PRECEDED BY THE SERRUCHO RIDGE.



Besides, Valle Nuevo is another example of the persistent tendency shown by the Chilian Expert of incorporating to his country regions over which Argentine jurisdiction has always been exercised without opposition. Geographers in the service of the Chilian Boundary Commission, who have visited the spot, acknowledge the existence of Argentine settlements. They try, indeed, to excuse the prolonged silence of Chile, arguing that such settlements were completely unknown, but, at the same time, they say that Chilian citizens have established themselves there, under the protection of Argentine laws; that is to say, in their opinion, Chile was unaware of the Argentine possession, but the Chilian citizens were thoroughly acquainted with it.

Dr. Steffen says,\* that on arriving on the Lake Superior he saw an extensive valley with magnificent pastures, *where he found traces of cattle, which made him think that he had reached an Argentine farm*; and his companion, Dr. Krüger, states:—

*"The character of the country, the conformation of the land, its vegetation and its climate, remind one of the Argentine Pampa."* †

Dr. Steffen adds:—

"The explorers were in the longitudinal valle called the Valle Nuevo, then peopled by colonists of Chilian nationality, who have been settled here for the last ten years, with the permission of the nearest Argentine authority, namely, the Governor of Chubut."

Dr. Steffen is mistaken in this last particular. At that time the nearest Argentine authority was that of "16 de Octubre," which is three days' march to the south. Also very near to the "Valle Nuevo" is the large settlement called Maiten, the property of the Argentine Southern Land Company, Limited, which has several farms in the neighbourhood. Since the date of the journey of Dr. Steffen, and with the permission of Argentine officials, many more farmers, Argentine, English, North American and German have settled in the Valle Nuevo. There are now thousands of cattle, and progress is assured with the proposed railway from Port San Antonio to Nahuel-Huapi, and Valle 16 de Octubre.

Dr. Steffen, engrossed with the impossible task of finding the means of

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\* Petermann's *Mitteilungen*, 1895.

† *Globus*, vol. 68, p. 10, 1895.

upholding the theory of the continental water-parting, could not but be impressed with the Argentine settlements he found in Valle Nuevo. In another article \* he has written :—

P. 55.—“ The whole of the intermediate region up to the foot of the Cordillera that divide the waters is occupied by a broad fertile valley with rich pasture—the ‘ *Valle Nuevo* ’—which, by the constitution of its soil, by its climate and vegetation, is very similar with its neighbouring Patagonian plateau. This longitudinal valley, almost enclosed by walls, bounded on the west by the central snowy masses, and on the east by the first spurs of the Cordillera dividing the waters, forms a plain extending several miles southwards, traversed by a river which flows into Lake Superior, and thence into the system of the Puelo, and has been inhabited for some years by several Chilian colonists, who have obtained their title deeds from the Argentine authorities. There does not exist naturally any direct traffic with the neighbouring region of the coast of Reloncavi, and those colonists have penetrated into the valley either from the east, or from the north, but at all events from the Argentine side. Our 1895 expedition was the first that showed to them the possibility of a route of communication with the inhabited parts of the Pacific coast through the valley of the Puelo. On the other hand, the existence of the colony in ‘ *Valle Nuevo* ’ was until then utterly unknown in Chile.”

This is not all. Though Dr. Steffen forgets the provisions of the Treaties according to which “ parts of rivers ” may lie in one or other of the two countries ; though he forgets that the course of the rivers when descending to the valleys is not an element to be taken into account for the delimitation ; though he forgets that Art. 2 of the Protocol of 1893, without mentioning waters, ordains that the main chain of the Andes should be respected, he adds in his report a significant paragraph which must be especially borne in mind since its author is and has been in the service of the Chilian Boundary Commission. He says :—

P. 57.—“ How must the frontier line be traced in that part of the Cordillera which we have just described ? By merely following the Andean water-parting principle, it is clear that the landmarks must be planted in the openings of the eastern chain ; but, by thus proceeding, it would be adjudicated to Chile the ‘ *Valle Nuevo*, ’ now in possession of the Argentine Republic, as well as the whole of the basin of Lake Superior, into which several rivers that cross through fertile territories flow. Within the formula of the absolute main chain nothing can be done ; for if it were sought to trace the line by following the series of summits of the above-mentioned central mass, such a line would unavoidably cut into two parts the course of the river Puelo and of the river Manso, and this, according to the Boundary Treaty, to the Protocol of 1893, which must be followed as an invariable rule, and to the Instructions to the Engineers of the Sub-Commissions, would not be admissible. Here is,

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\* Zeitschrift der Gesellschaft für Erdkunde zu Berlin, 1897, vol. 32



therefore, a difficulty, the solution of which, will very probably, be reserved for the Arbitrator."

It seems useless to repeat that the international documents to which Dr. Steffen refers, far from being opposed to the cutting of rivers, expressly ordain such a cutting, if necessary, when following the line of the boundary along the main chain of the Cordillera. But though his theoretical conceptions are in fault, his observations on the fact of the Argentine possession, and his doubts about the manner of tracing the frontier in this region, must be taken into account, as they once more confirm the correctness of the Argentine Expert's line.

Chile never objected to the Argentine settlements, because she knew that they were to the west of the main chain of the Andes, and because she also knew that up to the summit of the said main chain the Argentine Republic "exercises full dominion and for perpetuity." Only at the eleventh hour, in 1898, did the Chilian Minister in Buenos Aires represent against open acts of sovereignty accomplished by the Argentine Government, as if the effect of prolonged possession could be destroyed by a tardy communication.

## CHAPTER XXI.

- Summary*—1. THE VALLEY OF EPUYEN AND CHOLILA. GENERAL CONSIDERATIONS.  
2. EXPLORATIONS CARRIED OUT BY CHILIAN SURVEYORS.  
3. THE ARGENTINE LINE IN THIS REGION.  
4. REMARKS ON THE CHILIAN LINE.

1. THE VALLEY OF EPUYEN AND CHOLILA. GENERAL  
CONSIDERATIONS.

THE summit of Mount Piltriquitron, it has been said, commands on the west the lengthy longitudinal valley which runs parallel to the Cordillera de los Andes, and, on the east, the Valley Maiten through which flows the largest northern affluent of the Chubut river. Upon descending from that summit into the Valley Maiten, this is found to be formed of lacustrine and fluvio-glacial deposits, in the midst of which gently rises a small volcanic hill, covered with glacial material, and named Caquel Huincul. This hill commands a view of the valley towards the north, as far as the ravines of the upper waters of the river, and to the south can be seen the undulations of the valleys Cholila, Peladito and 16 de Octubre, and the lakes of the river Fetaleufu, these valleys being scarcely interrupted by Peladito Hill, which is another excellent point of observation for gaining a knowledge of the character of the country. A mere inspection of it would be sufficient to show the incorrectness of the frontier line proposed by the Chilian Expert, which the Argentine Expert has been compelled to reject. From the back of Caquel-Huincul are to be seen the low-lying pasture lands, with its various forms due to the glacial action. These lands are cut through by former outflows of the ancient lake, which entirely emptied when the breach of the Fetaleufu was opened. The cattle of the Maiten and Cholila farms graze in these pasture lands, which, for the greater part, are irrigated by waters that flow westward until they fall into the basin the western extremity of which is occupied by Lake Epuyen.

The view from Caquel-Huincul is suggestive. The lost glacier dug this valley, elevating its sides with the morainic materials which now form the

rampart of the fluvio-glacial terrace, and are intersected by rivulets that, from the east, run towards Lake Epuyen without reaching it, because the river Epuyen, flowing from the lake, absorbs them before turning suddenly to the north through the gorge opened in recent times, subsequent to the depositing of the pleistocene fluvio-glacial layers over which that river runs.

Señor Moreno visited this region in 1880 and 1896, and his description coincides with that of Señores Krüger and Stange, of the Chilian boundary Commission, who, by their journey of 1897, corrected the statements made by Señor Fischer in the account of his expedition of 1894. Señor Moreno \* says :—

P. 79.—“ In this region, near Caquel-Huincul (thus called by reason of a height of volcanic origin, covered by glacial detritus, which crosses the longitudinal valley), the principal branch of the Maiten is 30 metres wide, with, in March, a depth of 2 metres (6·56 feet) ; it flows at the foot of the eastern volcanic wall, while the valley stretches out towards the west 700 metres (2297 feet) above the sea.”

P. 80.—“ On the north, the Maiten is seen flowing down from a longitudinal ridge of some elevation on the north-west. Closer at hand, we find, opposite Apichig, a gorge whence the stream which gives its name to the river flows down from a secondary frontal moraine ; next a picturesque mountain group, two-thirds wooded, the highest summit of which (Piltriquitron), 1990 metres (6529 feet), is opposite Caquel-Huincul. At the foot of this group we find, in place of the glacier which has disappeared, the great glacial plain with Andean fragments left by the former. The hill of Caquel-Huincul is strewn with erratic boulders, some measuring as much as 50 cubic metres. To the west of the morainic plain, which begins at the foot of the hill, the stream flows down in a westerly direction, and the depression, which, in 1890, I noticed through the defile, corresponds, not to Lake Puelo as I then supposed, but to Lake Epuyen, which empties into it.

“ More to the south, behind the high moraine, called Cabeza de Epuyen, rise the snowy summits of Tres Picos, 2500 metres (8202 feet), preceding the high snowy range which, judging from the publications of the Chilian explorers, is probably identical with the main chain of the Andes. To the S.S.W. the long depression of the Cholila or Cholula region, the country of the traditional Chululakenes, is perceived ; here the series of lakes feeding the Fetaleufu begins. . . .

“ On the south the continuation of the longitudinal valley and the Lelej depression are seen. Señores Fischer and Stange, of the Chilian Boundary Commission, who crossed to the south, by Cushman (the usual road between river Tecka, ‘ 16 de Octubre,’ and Nahuel-Huapi), describe this region as follows : The former (according to Dr. Steffen) says that the ‘ Lee-Lee (Lelej) Valley intersects, in a north-easterly direction, a chain of inconsiderable elevation, soon re-uniting with the Valley of the river Chubut, which, shut in between bare summits of a leaden colour, descends from the far north-west. The

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\* Notes Préliminaires sur une Excursion aux Territoires du Neuquen, Rio Negro, Chubut et Santa Cruz, by Francisco P. Moreno, La Plata, 1897.

outlook was intercepted in this same direction by the imposing snowy Cordillera in which Señor Fischer thought to recognise the characteristic summits of the Centinela and the Observador, situated immediately south of the mouth and valley of the Rio Bodudahue.' Speaking of this same region the second-named gentleman expresses himself in the following terms: 'From this point a branch of the road leads to the Fofó-Cawello farm (*estancia*) on the left bank of the river Chubut; the other crosses some chains, among which a very extensive flat-topped hill, barren for want of water, is to be seen. . . . From this point the Cordillera de los Andes, with its very fantastic crests, becomes visible on the west, and towards the east the Fofó-Cawello hills. We discern in the Cordillera a large opening where a road to the canals of Chiloé must exist.'\*

"I have made these quotations in order to point out the differences which exist between the observations of the two explorers. I cannot understand how Señor Fischer could have seen the river Chubut flowing down shut in between bare leaden-coloured summits, where Señor Stange has seen a more extensive flat-topped hill, from which the Cordillera de los Andes appears, on the west. As he crossed the region between Lelej and Cushaman, he must have seen, unless heavy fogs veiled the western landscape, a morainic plain extending from the summits of Epuyen towards Fofó-Cawello, and forming the whole north-eastern plain of Lelej, Cushaman and Quelujaguetre; thus, necessarily, he could not have perceived the river Chubut shut in between mountains, as, at this point, there are no other heights than the low moraine through which the river has cut its channel.

"These inaccuracies in Señor Fischer's observations also occur in his map of the region, where a high chain, which does not exist, has been drawn in place of the plain, measuring many kilometres from north to south and from east to west. The great gorge seen by Señor Stange corresponds to the Epuyen and Puelo gorges."

P. 82.—"The glacial plain rises scarcely 10 metres (32·8 feet) above the Maiten, and is intersected by stream-beds, dry in summer, but which in spring-time carry the winter's waters to the Maiten, near the tributary streams of the Epuyen."

Señor Oscar de Fischer, in the "Carta General de la Region reconocida por la expedicion exploradora del Rio Palena, en Enero, Febrero y Marzo de 1894" (reproduced in Plate XV.), has drawn a ridge considering as snow-capped mountains, not only Mounts Piltriquitron and Lelej but also the intermediate plain between them. That ridge is also depicted by Dr. Steffen in the map which accompanies the German account of his expedition (Plate XVI.), and, in spite of its not existing in nature, is there shown with still greater prominence. It is also figured in the last map he has published, "Plano de la Región Patagónica reconocida por las Expediciones Exploradoras de los Rios Aisen y Cisnes 1896-1898," a map, which, according to Dr. Steffen's own words, is taken from the general chart of the Chilian Boundary Commission (Plate XXV.).

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\* Expedicion Exploradora del Rio Palena, Santiago, 1895.



Plate LXVIII., Fig. 1, a panorama taken from Caquel-Huincul, shows the geographical inaccuracy of these maps. The photograph represents a plain, where the maps depicted snow-capped mountains, and proves that it would be a vain task to try to demonstrate that there exists in that open ground the main chain of the Andes, along which the Chilian Expert says his proposed boundary line runs. These lands have been the property of the Argentine Southern Land Company, Limited, from 1888 ; however, the Chilian Government at that date made a representation to the Argentine Government, erroneously considering that the region was situated in a disputed territory. The Argentine Minister for Foreign Affairs, though answering that any act of jurisdiction in a part of the Cordillera de los Andes of doubtful dominion would not be taken into account when settling the boundary line, never held as being of doubtful dominion the eastern foothills of the Cordillera, and even less the regions outside it. To no one in the Argentine Republic did it ever occur that the Chilian Expert would pretend to extend the Chilian rights not only to the eastern sub-Andean valleys but to the open plains of Patagonia, nor that for the purpose of maintaining his doctrines he would build a mountain range in the air. Nevertheless, this imaginary mountain range, arbitrarily placed where it suited Señor Barros Arana's theory, caused the tardy claim of the Chilian Minister in Buenos Aires against Argentine settlements in territories where the Argentine Republic exercised "full dominion and for perpetuity"—Valle Nuevo, Epuyen and Cholila, among others.

The lands of the Argentine Southern Land Company to the east of the Cordillera de los Andes, had been surveyed and settled since 1888 ; and the Chilian explorers who have visited them have had an opportunity to verify that Argentine jurisdiction was exercised to the west of the continental divide, but they have never asserted that such jurisdiction was carried as far as the western slope of the Cordillera. To pretend to-day that Valle Nuevo, Epuyen and Cholila settlements are the result of an extra-limitation, and that these settlements must be considered as included in the verbal Agreement of 1888, is to disown the Treaties of 1881 and 1893. Nevertheless, this is what the Chilian Minister did, owing to an erroneous conception of the boundary line.

## 2. EXPLORATIONS CARRIED OUT BY CHILIAN SURVEYORS.

The Chilian explorers sent by Señor Barros Arana to survey that region have published their investigations, and they afford sufficient proofs that Nature contradicts the speculative views of the Chilian Expert and that the Argentine Expert's line is strictly correct.

Cholila and Epuyen Valleys, as well as the lake system on the south-west, were explored by some topographers of the La Plata Museum in 1896, and a year later by Señores Stange and Krüger, of the Chilian expedition sent to fix the exact situation of the continental divide in that part of Patagonia. Starting from the Pacific coast, Señores Krüger and Stange ascended the river Reñihue, and reached the main chain of the Andes, which in that region, is very rugged. Though this range is, as Dr. Steffen states, a prolongation of the Sierra Nevada, the explorers called it "Cordón Secundario" (secondary ridge), as they reserve the term "main chain of the Andes" for the "continental divide," where they place the "Cordillera hidrográfica," in accordance with the views of the Chilian Boundary Commission.\* It is, nevertheless, worthy of notice that now and then the explorers set aside these arbitrary classifications, and plainly state that they "crossed the *Cordillera*," when referring to that pretended "Cordón Secundario." They say, besides, that there are no mountains at all, but level ground, exactly in the same places where Señor Fischer, Dr. Steffen (see Plates XV. and XXV.) and the Chilian Boundary Commission have drawn on their maps a mountainous ridge to indicate the continental water-parting, a proceeding which was rendered necessary since the Chilian Expert had defined the "main chain of the Andes" as a continuous line of summits that divide the waters which flow to the Atlantic and to the Pacific Oceans.† If they crossed the

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\* *Hydrographic Cordillera* is a somewhat confusing classification when applied to a mountain range.

† Señores Krüger and Stange, in their Informe Preliminar sobre la Expedición exploradora de los Ríos Reñihue y Fetalefufu, en la Patagonia Occidental, say:—

P. 125.—"In order to cross the *Cordilleras* situated to the east of the lake, we could have chosen any one of the ravines that strike the creeks to the north, north-east or south-east, as we are convinced that every '*quebrada*' (gorge) offers a pass, more or less easy to travel through; but we found it better to utilise the old partially made routes, so as to lessen, as far as possible, the difficulties presented by the virgin forests, and thus arrive more speedily upon the real field of our operations. With this object we returned to the northern creek, passed the river by a fjord, and commenced a big clearing of the bush on the right bank, with the fortunate result that we found traces of a path completely destroyed by floods. We immediately decided to

Cordillera on their way to the continental divide, it is evident that the continental divide is outside the Cordillera, to the east of it.

The so-called *Cordón Secundario* (Secondary Ridge) was crossed by the Chilean explorers by a gap, to which they attributed an altitude of 900 metres (2953 feet) above the level of the sea (1000 metres, 3281 feet, is the height determined by the Argentine surveyors), situated in the Navarro Pass. Señores Krüger and Stange observe that the descent is "extraordinarily steep," and that they had "to cut a winding path, which, for steepness, may be compared to the slope down the side of Ipela at the Lacar Ranco Pass," along which the Argentine line is traced.

Drs. Krüger and Stange visited afterwards some of the lakes reconnoitred in the previous year by the Argentine Surveyors, and arrived at "a large valley extending far to the north, *the surface of which is undulating, and resembles the pampa as regards the character of its features.*"\* Then they add:—

P. 135.—"The low hills as well as the valleys have a north and south direction, being contained between the snowy mountainous region † on the west, and the water-parting ridge on the east, and, from an orographical point of view, form a single longitudinal valley which in the Argentine maps is named *Cholila*: but it is uninhabited—only certain tracks indicate that Argentine engineers have measured the ground. We travelled for many hours through a valley, since named 'Valle del Regreso,' without coming across a single drop of water. Next day we ascended a low hill which forms part of the dividing line, ‡ and without passing by an opening properly so called, we entered into Argentine territory. § From an Indian who was hunting guanacos we heard that we were on the right road, and that we were but a few leagues from our destination. We followed a gently sloping valley going east and south-east, and we soon reached regions which we already knew, having previously visited them during

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cross the Cordillera through this valley, and gave orders that everyone who could do so should devote the whole day to clearing the path so as to enable us to travel over it.

P. 127.—"On January 11th, we approached the neighbourhood of the gap (boquete). The forest has become thinner, and the *raulies* and dwarf cinnamon begin to predominate. We advanced quicker, although the gradient was becoming steeper, and crossed two small tracts of level ground and a large, picturesquely situated plain. These plains allow a free view of the *snowy summits*, but are damp and swampy, similar to those which we found in 1894 at the pass of Puyehue. Eastward of these there exists a small narrow pass, where the highest point is to be found. We passed the watershed line between the region of the Reñihue and that of the Fetaleufu, at a height of nearly 900 metres (2953 feet) (the Felipe Navarro Pass).

"The descent to the east is extraordinarily steep. Through thick brushwood we cut a winding path which, *for steepness, may be compared to the slope down the side of Ipela at the Lacar-Ranco pass*" (Memoria de Relaciones Exteriores de Chile, Santiago 1897).

\* Memoria de Relaciones Exteriores de Chile, Santiago 1897.

† The main chain of the Cordillera de los Andes.

‡ The so-called chain of the continental watershed outside the main chain of the Cordillera.

§ Argentine territory had commenced in the eastern slope of the main chain of the Cordillera de los Andes.



the expedition to the Palena river. . . . The farm where we arrived in the evening of the 27th is one of the many which belong to the Anglo-Argentine Company, who possess almost the whole land between the Chubut and the Limay rivers.\*

P. 137.—“All the valleys and low hills covered with high grass are excellent pasture lands. Down the slopes of the low hills run little rivulets, and low bushes supply wood for fuel. We met many guanacos that come into these regions, which are fairly open towards the Patagonian plains, whilst none of these animals stray into the Valle Nuevo and Valle 16 de Octubre, connected by *relatively* narrow passes with the said plains.

P. 138.—“The course of the *continental divide* within the ground we explored at this time is of great interest. On both sides of the Upper Chubut Valley and the Cholila Valley, which is situated in the southern prolongation of the former, extend four mountain chains: on the east the *Chubut and Leleque* chains, separated from one another by the *wide passage* which the Chubut river has made for itself; and on the west by the *MAITEN AND CHOLILA CHAINS*, separated by two deep gaps, and by an *intermediate isolated mountain group*. In the northern region the water-parting is formed by the Maiten chain, and in the southern by that of Leleque. The distance of about 20 kilometres (12·4 statute miles) between the two chains is occupied by a considerable extent of undulating country in which the water-parting forms an arch open to the north and north-east.

“At the suggestion of Señor Selle, the question was often discussed as to whether the cause of this peculiar orographical formation must be looked for in the fact that the Chubut-Cholila depression was formerly a great *lake-basin* bounded on the west and east by high mountain chains. The steps observed at the foot of the Cordilleras confirm this opinion, as also does the great number of boulders on the hills, and the waterworn rocks on the edge of the valley which may have formed the shores of the lake. Originally the Fetaleufu river was the southern outlet of this lake: since then the Chubut has opened out a passage towards the east.†

“West of the second astronomical station, *three immense mountain groups* are to be seen. In the prolongation of the group to the north (Maiten chain) we find two passes leading to the *Valle Nuevo, or Florido*. The southern group (Cholila ridge) extends uninterruptedly to Fetaleufu lake. On either side of the third intermediate group there are *two wide gaps* through which the road leads to *another longitudinal depression*, lying to the west of the Maiten-Cholila chain. Here are the two lakes which empty themselves into the upper lake of River Puelo.‡ It was impossible for the expedition to explore this region, called Epuyen, in detail, because of the difficulty of travelling far into the Pampas on foot. It must be done on horseback, and this was not possible for us, owing to repeated refusals at the Leleque farm to supply us with horses.”

Continuing their explorations to the south, their attention was attracted, to the

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\* The valley crossed by Dr. Krüger beyond the lakes has belonged since 1888 to this Company, by whom it is used for cattle farming.

† If the explorers had seen the eastern region, very probably they would not have considered the Fetaleufu the old outlet of the ancient lake. The old outlet was the Chubut, the gorge of the Fetaleufu being of very recent origin.

‡ There is only one Lake Epuyen.



west, by a high snow capped Cordillera, which, owing to its pyramid-shaped peaks, they called the “Cordón (ridge) de las Pirámides,” and they say :—

P. 141.—“In the abruptness of its slopes and the extent of its snow-fields, it is not surpassed by the Cordon de los Castillos.”

Resuming their work, they state :—

P. 146.—“The River Reñihue has a very strong current, is not navigable, not even in its mouth, and *has its origin in the intermediate or central ridges of the Cordillera, without any connection with the continental division of the waters.*”

P. 147.—“*The massive and highest part of the Cordillera, between 42° and 43° S. lat. is situated between the high ridges of the Pacific coast and the water-parting cordon. There exists here a series of snowy ridges, such as those of Castillos, Pirámides, Torrecillas, etc., which have a general north-south direction, and attain an altitude of at least 2000 metres (6562 feet). These intermediate masses may be crossed by secondary passes, such as the Menendez and Navarro—this one of 900 metres (2953 feet). Its snowfields pour their waters to both sides : on the west in the fluvial system of the Bodudahue and the three tributaries of the Lake Superior of Reñihue ; on the east in the river which forms Lake Nicolás, the tributaries which empty into the inlets north and south-west of Lake Montt, and the affluent of the north-west of Lake Menendez.*” \*

Dr. Krüger has published in the Globus an interesting Report† on the Exploration of “Western Patagonia,” as he and his companions call the *two slopes* of the real main chain of the Cordillera de los Andes, both of which slopes, according to the *continental divide* theory, are considered as Chilean territory. In this account, of which some paragraphs have been quoted on page 548, he states :—

“Travelling in southern Chile is therefore infinitely more difficult than in the central and northern provinces of the country, and important observations there are not so easily obtained. At the same time the variability of the weather, and the impossibility of marching in swampy forests, generally compel the traveller to make greater sacrifices of time than he had originally anticipated.

“Still greater troubles are in store for the traveller in the higher defiles of the river. The broad valley with extensive alluvial plains, and the high mountain chain bordering them, are succeeded by a high plateau into which the river has cut a deep channel, forming a canyon many kilometres wide. Steep rocks, with almost perpendicular walls

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\* Lake Montt is the Lake Menendez discovered in the previous year by the expedition of the La Plata Museum. Lake Menendez of Señores Krüger and Stange is the lake Krüger thus named by the above-mentioned expedition.

† West Patagonia and the expedition for its exploration, by Dr. Paul Krüger, Santiago in Chile, from Globus vol. 71, Feb. 20, 1897.

close in the valley in the manner of a ravine, leaving to the river here and there only the breadth of a few metres. In the depths of the ravine the water shoots in extremely sharp curves. Great blocks of rock impede its course, and give rise to an uninterrupted series of huge foaming water-falls. Frequently not so much as a small edging of bank offers a foothold to the traveller who, pressing on to his goal, is obliged to scramble up the heights.

"Between the water-parting chain in the east and the central mountain masses in the west,\* run extensive valleys of considerable value for agricultural purposes, the best lands, beyond doubt, in the whole of Patagonia. Included in these are the Valley Nuevo, the Valley of Cholila, the Valley of the 16 de Octubre, the Valley Frio, the Valley of the Carrileufu, and others still unexplored. All these depressions exhibit magnificent pastoral plains of almost unlimited extent, *and are traversed by low hills everywhere passable for horses*; they are watered by numerous rivulets fringed on both sides with bush forest. Here the conditions are eminently favourable for the settlement of agricultural colonies, but above all for cattle rearing. Although all the waters *to the west cut their way through to the Pacific, and the valleys accordingly belong to Chilean territory, yet, by reason of their easier accessibility from the east, Argentine colonists, or colonists under Argentine supervision, have settled in these districts, of course without the knowledge of the Chilean authorities.*† *Shut off as they are on the western side, these valleys have hitherto been, so to speak, unknown in Chile.*‡

The lengthy extracts from reports of Chilean explorers, or of the persons employed upon the Boundary Commission of that country, are quoted in order to demonstrate by means of the very data of the said explorers, the correctness of the Argentine Expert in carrying the line over *the snowy crest of the Cordillera*, and the incorrectness of the Chilean Expert in carrying it over *parallel broken ridges outside the Cordillera, or over the Argentine plains.*

Chilean writers sometimes say *that the continental divide, although lying to the east of the main chain of the Cordillera, properly so called, occurs within the Andean system*; but this statement does not bear the most perfunctory analysis. The *Andean system* cannot serve as a boundary. In the opinion of many geographers the Andean system comprises the whole of the mountains of South America, with the exception of the Brazilian system, and no one, either geographer or statesman, could ever seriously attempt to maintain that the

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\* This is the main chain of the Cordillera de los Andes, both slopes of which are claimed by Chile, notwithstanding the long possession of the eastern slope by the Argentine Republic.

† Here Dr. Krüger speaks as the employee of the Chilean Expert; these lands never belonged to, nor were occupied by Chile.

‡ This is a mistake which it is necessary to rectify. The Argentine Republic has never taken any steps towards the colonisation, without having given the widest announcement thereof, in her official publications, and in the daily press. Chile has not followed on the same lines, keeping secret her acts, as in the case of mining concessions to the east of the Valley 16 de Octubre, and other permissions granted by authorities of the Chilean Territory of Magallanes which have been acknowledged only in 1898, having, however, been granted many years before.

"Andean system," with the many different chains it contains, is what the negotiators of the 1881 Treaty had in view. The Chilean Boundary Commission has, however, lately endeavoured to uphold this absurd contention by showing on their maps indications (generally erroneous) of mountains which reach *as far as the centre of the Argentine Republic*, at the same time failing to depict those which form the Chilean Cordillera de la Costa, and their Expert has gone so far as to pretend that if the highest peaks are taken as the boundary, the dividing line might pass by the Nevado de Famatina, far into the Argentine province of La Rioja. But it has already been proved, beyond possibility of refutation, that the dividing line stipulated must be sought within the Cordillera de los Andes, in accordance with the directions of the Treaty, such limit being an immovable one, and that the Cordillera de los Andes has its lateral extent perfectly defined: on the west by the low-lying ground of the longitudinal valley of Chile, and on the east by a similar depression, to which Valleys Nuevo, Cholila, 16 de Octubre, etc., belong. The character of this depression is so well marked that the Chilean explorers themselves cannot avoid acknowledging that to the *west of it rises the Sierra Nevada*, impassable except "through narrows and majestic defiles." On the other hand, on the eastern side of it there are generally to be found ridges of little altitude, which exceptionally contain very few summits of 2000 metres (6562 feet), over an extent of nearly 700 miles, while in the Cordillera, south of 40° S. lat., the summits of 3000 metres are numerous, and there are also several heights approaching to 4000 metres.

The same explorers have also admitted that the valley of the river Chubut or Maiten is the same valley as that of Cholila and 16 de Octubre, bounded in part on the east by the ridge of Lelej and Esguel, with heights of 1200 to 1800 metres (3937 to 5906 feet), and that no mountainous pass exists between the valleys Cholila and Maiten, but that there is *an opening of twenty kilometres* (12·4 statute miles) in width.

This opening is the bed of one of the eastern arms of the ancient great lake referred to by Señor Moreno in the account of his journey of 1896 already quoted, which great lake till post-glacial times poured its waters into the Atlantic through the opening of Fofó-Cahuel, before the erosion combined with volcanic action and the recent gradual upheaval of the Patagonian tableland caused the outflow of the great lake by the Puelo on the one side, and the Fataleufu on the other.



The transcriptions from the Chilian publications likewise prove that the very conditions of the ground, and the difficulty of access by the west of the main chain of the Cordillera, indicate that those regions and their waters belong to the eastern slope of the Cordillera de los Andes.

The communication between Chile and the Argentine Republic from west to east *will always be exceedingly difficult south of 41° S. lat.* The conditions of the climate, and the *ruggedness of the mountains*, to say nothing of the vegetation, *will prevent the construction of good roads*, which even if capable of being, at very great expense, kept up in the summer, could only be utilised during that season; *for nine months in the year they would be impracticable, while communication between the Atlantic and the eastern slope of the Cordillera may take place without any expense*, at every point of the stipulated boundary line as far as 52° S. lat. Access is now daily open to the colonies which the Chilian explorers have referred to: Nahuel-Huapi, Valle Nuevo, Maiten, Cholila, 16 de Octubre, etc. Communication with the west of the Cordillera does not exist, and, according to the statements quoted in the south of Chile these places have remained unknown. Besides, the difficulties of access encountered by the explorers at every step on that side *have been so great* that none of the Chilian Boundary Commissions\* have penetrated from the Pacific coast to the south of the Pass of Perez Rosales, near Nahuel-Huapi. All these Sub-Commissions have worked to the east of the Cordillera, without ever approaching to it, except in the neighbourhood of Nahuel-Huapi, where they partly followed the roads opened by the Argentine Sub-Commissions. The Argentine Commissions have crossed the Cordillera by the Bodudahue, Reñihue, Fetaleufu, Palena, Pico, Aisen, Las Heras, and other rivers, at the cost of great hardships, with the sole object of surveying transversal sections of the chain, and without ever attempting to do so with loads of any weight.

### 3. THE ARGENTINE LINE IN THIS REGION.

It has been already said that the Argentine line cuts the river Puelo in its deep narrow gorge. In order to determine that line in the Cordillera, investigations have been made with which it is of interest to acquaint the Tribunal. The Argentine Expert, Señor Moreno, left one of his assistants, Señor Schiorbeck, in

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\* The explorations of Señores Steffen, Krüger, Stange and Fischer have been only auxiliary, ordered by the Chilian Expert, and independent of the international assistants to which the Convention of 1888 refers.



December 1897, at the mouth of the river Bodudahue, where it falls into the Comao Inlet, in order that he should proceed up the river as far as its sources, and then cross the Cordillera in that neighbourhood. The river Bodudahue had been explored towards the end of last century by Father Menendez, and in 1863 by Señor Francisco Vidal Gormaz of the Chilian Navy.

Dr. Francisco Fonck has published the diary of Father Menendez's journey, and Señor Vidal Gormaz has given a brief résumé of his excursion of 1863. Upon comparing both accounts it is seen that they do not agree. Whilst the



RIVER BODUDAHUE AND THE CORDILLERA.

first explorer, after going through great hardships, climbs over a lofty pass, and descends near a lake, shut in by mountains, before reaching the plains of Patagonia, the second arrives at an easy pass, and finds himself confronted by the same plains. Reports so contradictory called for an examination of the ground, and Señor Schiorbeck was directed to make it. The position of his point of departure at the mouth of the Bodudahue having been determined, it was found that the latitude of the said point did not coincide with that indicated in the Chilian maps. The result of several observations showed that

there existed a difference of 11'. On ascending the river it was then found that it divided itself into two great branches, of which the one to the south had been chosen by the former explorers. Señor Schiorbeck took the eastern branch, and after sixteen days of hardships, having passed through the steep valley dominated by lofty mountains and glaciers, and having climbed a very steep hill, arrived at a gap in the main chain of the Andes, where, to the west, the river takes its rise from the melting of the overhanging glaciers, and to the east an affluent of the Fetaleufu is to be found. The two photographs, here inserted, of the gorge of the river Bodudahue between the snowy peaks of the



RIVER BODUDAHUE, TO THE W.N.W.

(From a photograph taken near the gap in the main chain.)

Cordillera, as well as that of the height of 1072 metres (3817 feet), in the edge of the main chain of the Andes, at the point determined by the Argentine Expert with No. 288 of the dividing line, prove by themselves that the Treaties have been strictly applied.

In order to gain an idea of the character of the mountains in the space comprised between the rivers Puelo and Bodudahue, the Surveyor

ascended Mount Trepado, 2400 metres (7874 feet) to the north-east of the gap. From there he perceived, amongst a number of high peaks surrounded by glaciers, a ridge corresponding to the main chain—to which the crossing gap belongs—which runs from north to south, and to the eastward mountains lesser in height, gradually descending towards the Cholila plain. Having descended to the eastern valleys he reached the third lake crossed by Father Menendez, and came to the place where, the preceding year, Señores Krüger and Stange encamped, who, as has been said, crossed the Cordillera by the Navarro Pass, 1000 metres (3281 feet), on the river Renihue. (The photograph from Mount Trepado represents the summit of the Cordillera close to the gap of Navarro.) A second ascent

to Mount Subir, 1870 metres (6135 feet), showed that the principal line of lofty snowy mountains formed, beyond river Puelo, a slight curve to the eastward, which includes Mounts Tres Picos, 2530 metres (8301 feet), 2600 metres (8530 feet), 2550 metres (8366 feet), Anexo, 2510 metres (8235 feet), Pico Alto, 2000 metres (6562 feet), Dos Picos, 2530 metres (8301 feet), Pico Chato, 2440 metres (8005 feet).

The photographs in the text represent this region : Mounts Tres Picos



GAP IN THE MAIN CHAIN (1072 m.; 3517 f.), BETWEEN THE SOURCES OF RIVERS  
BODUDAHUE AND NAVARRO, TO THE SOUTH-WEST.

Argentine landmark No. 288.

and Anexo ; Mounts Alto, Anexo and Tres Picos, with the valley of the Tigre river ; the mountains to the south-west of Mount Subir ; and the mountains towards the west, with Mounts Chato and Dos Picos. These photographs prove the incorrectness of the Chilean explorers in calling this mountainous mass "Cordón Secundario," so much so since they try to convert the level ground of Cholila, Epuyen and Maiten, represented hereafter into a range of mountains, calling it the "Cordón Central Divisorio." It must be observed that no geo-

grapher has hitherto accepted such a denomination, and Dr. Steffen himself, although depicting in his maps this pretended "Cordón Central Divisorio" in the level ground, considers as the main chain of the Andes the chain where the above-mentioned gap of Navarro occurs, which is the prolongation of what Dr. Steffen calls the Sierra Nevada, and which is cut through by the Palena or the Carren-leufu river near the place where he gives to the same chain the name of "Cordón Central."\*

The Cordillera in the section comprised between the Bodudahue Pass and



THE CORDILLERA FROM MOUNT TREPADO (2400 m.; 7874 f.).

the narrow gorge of the river Fetaleufu, presents the same rugged and formidable features as the main chain just described. This section has been studied since

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\* In the course of a critical examination of Dr. Fonck's work, "*Viaje de Fray Francisco Menendez á la Cordillera*," Valparaiso 1896, published in the *Scottish Geographical Magazine*, 1897, vol. 13, p. 669, there appears the following:—

"Unfortunately he had introduced the boundary question into his exposition, and in this connection he regards the watershed as the central Cordillera, speaking of the main elevation as a lateral cordon. We can only express our dissent from this view, as a full discussion would take too much space."



*Depression of Esquel.*

*Mount Loley*  
(2030 m.; 6660 f.).

*Continental Divide.*

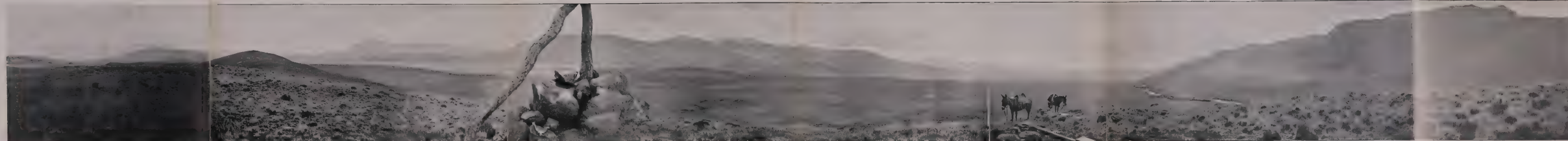
*Opening of Esquel.*

*Mount Pulguitron*  
(2190 m.; 7188 f.).

*River Maiten.*

*Eastern Ridge of Maiten.*

FIG. 1.



THE PLAIN OF CHOLILA AND MAITEN FROM CAQUEL HUINCUL.

*Mount Las Torres-Nas*  
(7415 f.).

*Lake Maudes*  
(485 m.; 1591 f.).

*Pirámides Ridge*  
(2460 m.; 8071 f.).

*Volcano Minchimokuida*  
(2410 m.; 7907 f.).

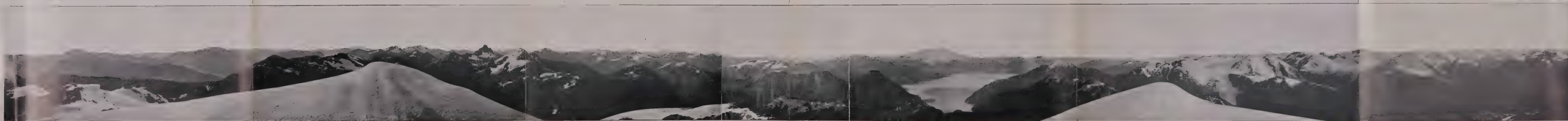
*Main Chain of the Andes.*

*Mount Chato.*

*Mount Dos Picos.*

*Mount Tres Picos*  
(2500 m.; 8200 f.).

FIG. 2.



PANORAMA FROM MOUNT 30 DE MARZO.



1898 by the Argentine Surveyors, and the investigations made after Señor Moreno proposed his line tend to support the course he has adopted when tracing it throughout its entire length.

In the Records where the Argentine line is described, all the gaps and accessible points of the Andean mountain range are not mentioned, but only the principal points necessary to lay down that line in a general manner. Accordingly, there do not appear therein the various gaps to be found in the main chain of the Cordillera to the south of the Bodudahue-Cisnes Pass. Close



MAIN CHAIN OF THE ANDES, SHOWING MOUNTS ANEXO AND TRES PICOS  
FROM THE RIVER TIGRE.

to the gap of this Pass rises Mount Torrecillas, 2260 metres (7415 feet) high, and between it and the mount "30 de Marzo" innumerable lofty peaks overlook the basins of the rivers Bodudahue and Navarro on the north, and those of the rivers Alerces and Reñihue on the south, the foot of their eastern slopes being washed by the arms of Lake Menendez, and that of the western by Lake Reñihue. Rugged gaps of between 1000 and 1100 metres (3281 and 3609 feet) in height, give access, with great difficulty, to the different gorges, forming a charac-

teristic profile above which towers the mass of the main chain. Plate LXVIII., Fig. 2, represents the panorama of the whole horizon from the top of Mount "30 de Marzo," and renders any description unnecessary. Plate LXIX., Fig. 1, gives an exact idea of the valley of Lake Reñihue, and standing out in relief is seen the snow which crowns the "Pirámides" ridge, close to Navarro Gap, through which travellers may pass from the Reñihue Valley to the eastern Andean lakes. Fig. 2 of the same Plate shows the different gorges into which the valley splits up as it approaches the main chain.



MAIN CHAIN OF THE ANDES. MOUNTS ALTO, ANEXO AND TRES PICOS.  
THE RIVER TIGRE AT THE CONFLUENCE OF RIVERS 1 AND 2.

By the northern gorge, the gap de la Cruz is reached. A photograph showing the river de la Cruz which flows at the foot of this gap, as well as the snowy masses situated between it and the river Bodudahue is inserted herewith. The next photographs represent the scenery from the gap of Los Alerces to the west, the main chain between rivers Alerces and Reñihue to the north of Navarro gap, and the valley of La Cruz from the gap of the same name to the east (the snowy ridge is that of Las Pirámides).



FIG. 1.



LAKE REÑIHUE TO THE EAST FROM THE VALLEY TORRENTES. MOUNT PIRÁMIDES AT THE END.

FIG. 2.



LAKE REÑIHUE TO THE EAST, AND THE MAIN CHAIN.

[Face p. 786.



The complete panorama presented in Plate LXX., Fig. 1, is even more characteristic than that contained in Plate LXVIII., Fig. 2. It was taken immediately to the north of the Navarro Gap (No. 289 of the Argentine line), and embraces a clearer view of the mountain range, containing the granitic main chain, with Mounts Torrecillas, 30 de Marzo, and the still active volcano of Minchimahuida, 2410 metres (7907 feet), which is visible over the whole depression of the Reñihue Valley.

The region to the east of the main chain is no less characteristic. One of



MOUNTAINS TO THE SOUTH-WEST OF MOUNT SUBIR (PICO BAYO AND FEROS)  
AND THE RIVER TIGRE.

the photographs inserted in the text shows Mount Torrecillas and its glacier overhanging Lake Menendez. Plate LXXI., Fig. 1, represents Lake Stange, which drains into the river Fetaleufu, and the mountainous region of the north-west and north, in which the summits of the Pirámides ridge are clearly defined. Fig. 2 of the same Plate contains the mountains and hills in front of the river Fetaleufu, into which Lake Krüger, also represented in the figure, empties itself: the depression away to the west contains Lake Stange. The photograph

representing the Ridge de los Castillos to the south of Navarro Pass up to the narrow gorge of Fetaleufu proves once more that the Cordillera exists there.

The main chain of the Andes, to the north of Navarro gap, contains heights reaching to 2600 metres (8530 feet), such as Mount Tres Picos, 2530 metres (8301 feet), 2600 metres (8530 feet), 2550 metres (8366 feet), Anexo, 2510 metres (8235 feet), Chato, 2440 metres (8005 feet), Dos Picos, 2530 metres (8301 feet), Las Torrecillas, 2260 metres (7415 feet), Las Pirámides, 2420 metres (7940 feet), 2360 metres (7743 feet), 2460 metres (8071 feet), 2320 metres (7612 feet), 2080



THE RIVER TIGRE TO THE WEST, AND MOUNTS CHATO AND DOS PICOS  
IN THE MAIN CHAIN OF THE ANDES.

metres (6824 feet), Mount 30 de Marzo, 1900 metres (6234 feet), 1850 metres (6070 feet), 2100 metres (6890 feet), 1910 metres (6267 feet), Alerces, 2050 metres (6726 feet), 1840 metres (6037 feet), 1910 metres (6267 feet), 2070 metres (6791 feet), etc. Its altitude decreases to the south, and its highest summits vary between 1800 metres (5906 feet) and 1600 metres (5249 feet), in the ridge of Mount Castillo and Espolón, while those which rise to the west and south-west of the river Fetaleufu between the volcano Minchimahuida, 2410 metres (7907 feet),



1910 m.; 6267 f.

2070 m.; 6791 f.

Mount 30 de Mayo  
(1900 m.; 6234 f.)

Volcans Michinskaido  
(2410 m.; 7897 f.)

FIG. 1.



PANORAMA FROM NAVARRO GAP (1000 m.; 3281 f.). Argentine Landmark, No. 289.

FIG.



Leley Hills.

Eastern Ridge of the Cordillera.

PANORAMA TAKEN FROM PELADITO HILL (1840 m.; 6036 f.), AND SHOWING THE VALLEY OF CHOLILA (680 m.; 2231 f.).

Valley Chobla-Maites.

Continental Divide.  
Chilian Landmark, No. 289.

FIG. 2.



FIG. 1.



LAKE STANGE, FROM THE SOUTH TOWARDS N.W. AND N.

FIG. 2.



LAKE KRÜGER FROM E. TO W., SHOWING AT THE END THE DEPRESSION CONTAINING LAKE STANGE. [Face p. 757.]





and the volcano Corcovado, 2330 metres (7644 feet), are higher; but as the river Fataleufu, when it comes out to the west of the bend, where it enters the valley 16 de Octubre, flows between rugged hills and narrow gorges impassable by water and difficult to cross by the hills, the Argentine Expert, taking into account the general direction and the features of the main chain, has proposed that the frontier line may pass along it, in the direction of its great heights to Mount Blanco, thus cutting the river at the narrow gorge. Between this gorge and Lake Menendez and the Gap of Navarro, *on the eastern slope of the main chain*, are several valleys



THE MAIN CHAIN, FROM CRUZ GAP TO THE NORTH-WEST.

in oblique direction to the axis of the Cordillera. One running down to Lake Stange contains several smaller lakes, which are fed by the waters from the hills to the south of Lake Menendez and the ridge of "Piránides." The main chain follows to the south, descending at the breach where the great stream of the Fataleufu rushes in rapids and cataracts into the gorge mentioned, which is not more than 6 or 7 metres wide, hemmed in by perpendicular walls, at which point the Argentine line passes, as it is on the axis of the chain. More to the west, the Fataleufu enters the long narrow Lake Yelcho, at the western end of which rises

the river Yelcho, which carries to the Pacific all the waters of the system of the Fetaleufu, which waters, before the gorge was opened, flowed into the Atlantic. The bend of the Fetaleufu, forming a V, appears to correspond to a tectonic fracture. The proximity of the great volcanoes in that region—some to the west being still active—has probably contributed to these Andean fractures or lines of weakness, which erosion has enlarged, advancing to the east until the great lakes of the east of the Cordillera were totally or nearly emptied. The inserted photographs reproduce the rapids, gorges and torrents in the neighbourhood, all of which are impassable, and shows where the line cuts the river Fetaleufu in a north and south direction, in a point where it cannot be denied that it corresponds to a natural frontier line as is the one agreed to between Argentina and Chile. It will be difficult to establish inhabited places of any importance in its neighbourhood. The inclemency of the weather and the rugged nature of the mountains would always prevent this.



PHOTOGRAPH TAKEN FROM THE LOS ALERCES GAP TO THE WEST.

Map IV. representing this region—as well as that to the south of  $41^{\circ}$  S. lat.—and the figures and plates already referred to, give a complete idea of its

general features, and would suffice by themselves to justify the line proposed by the Argentine Expert between Nos. 288 and 289. The point where this cuts



THE MAIN CHAIN OF THE ANDES BETWEEN RIVERS REÑIHUE  
AND ALERCES.

the river Fetaletufu bears no number, the Argentine Surveyors having examined that part of the course only in 1899, and therefore after the date on which that line was projected ; but this is of no importance, as the line cuts the river at a narrow gorge through cascades, as is the case with rivers Huahum, Manso and Puelo.

#### 4. REMARKS ON THE CHILIAN LINE.

The Chilian Expert has stated in the Record of August 29, 1898, that the valley of Epuyen (No. 289) separates the hydrographical basin of the Chilian river Puelo from that of the Argentine river Chubut. The waters of the eastern longitudinal valley, called the Valle Nuevo, flow irregularly to the Puelo, thus

forming an abnormal basin : those of Lake Epuyen, which run down the eastern spurs of the Cordillera de los Andes, also flow irregularly to the west into the Lake Puelo by another gorge, and abnormally form a part of the same basin, which though really belonging to the Chubut basin, is now separated from it by the fluvio-glacial terraces, a case similar to that of Lake Lacar between the river Quilquihue and the Calfuco stream. The river Maiten or Upper Chubut occupies in this zone the same situation as the river Quilquihue in that of Lake Lacar.



THE VALLEY OF LA CRUZ, FROM THE GAP OF THE SAME NAME  
TO THE EAST.

At the present time this valley also abnormally separates the waters of the river Puelo from those of the Chubut or Maiten river (its northern affluent). It is said *abnormally*, it having been accurately stated by Drs. Krüger and Stange that the Maiten valley and the Cholila valley are one and the same. This fact has not been taken into account by the Chilian Expert, when claiming that the boundary marks *should be erected* at the point of separation of the valleys.



The valley of Epuyen (or Cholila) is occupied by a large plain covered with pampas grass, which the water-parting crosses by a line of gentle undulations, according to Dr. Krüger, the Chilean explorer.\*

Southwards of this valley, the line of the Chilean Export is thus described:

"The Cordilleras Lelej and Esquel, the opening of Esquel gap, the gap Nahuel Pan, Mount Thomas, opening Sínica, Mount Teea, the opening of Lake Cronómetro, the Capriel Ridge, and Mount Cuche, marked with the numbers 290 to 298, separate the hydrographic basin of the Chilean river Fetaleufu from that of the Argentine river Chubut."



MOUNT LAS TORRECILLAS, FROM ISLA GRANDE.

The incorrectness of such a line, not only in its relation to the Treaties in force, but also from the point of view of political requirements, is apparent. It has already been seen that the gap of Epuyen or Cholila, does not form an actual separation between the valleys of Cholila and Maiten, and that, in the opinion of the sole explorers in Chile's service who can speak from personal knowledge, Drs. Krüger and Stange (those points have not been surveyed by

\* Memoria del Ministerio de Relaciones Exteriores de Chile, Santiago, 1897, p. 138.

the Chilian Boundary Sub-Commissions), the Maiten Valley is prolonged as far as the Colony of 16 de Octubre. In the view of those explorers, the division of the



THE MAIN CHAIN OF THE ANDES, 43° 18' S. LAT.

continental waters by running in opposite directions does not interrupt the course of the valley, and therefore, according to the Treaties, there cannot be erected a landmark. The only barrier according to the agreements, and of which mention is made in the Protocol of 1893, is the dividing ridge of the main chain of the Cordillera de los Andes. Therein are situated the mountain passes where the boundary marks must be planted ; and those sites are not in the Epuyen opening, nor in that of Quilquihue, neither are they in the fjord which contains lakes Gutierrez and Mascardi.

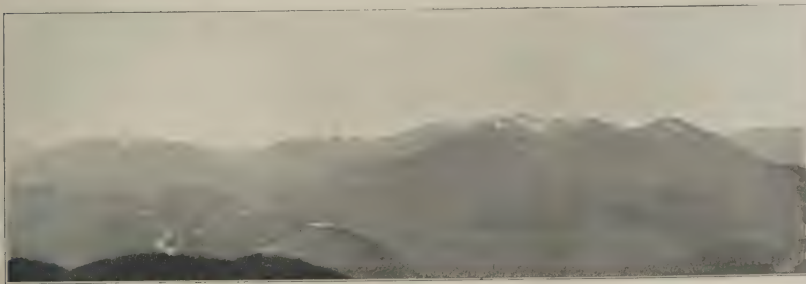
The same explorers have likewise said :—

P. 148.—“All the rivers run within the general *system* of the Cordillera ; the inter-oceanic *divortium aquarum*, however, turns considerably aside towards the east. The small lakes of the Cholila valley, and the basins of all the lakes of the upper Fetalenfu, are separated from the Patagonian plain by an uninterrupted and very characteristic Cordillera, a chain of from 1200 to 1500 metres (3937-4921 feet) in height (the Leleque ridge and its southern prolongation), which extends in a north to south direction from Chubut valley to the Valley 16 de Octubre, and the summits of which are at some points never free from snow, even in summer. The upper valley of the Chubut, situated more to the north and

emptying into the Atlantic, is separated from the Puelo valley by the Maiten chain, which is also a water-parting. Between the two chains, the Leleque and the Maiten, however, *there is a distance of some 20 kilometres (12·43 statute miles) across, consisting of an extensive undulating surface, covered with high pasture-land, in which the water-parting must be sought in a series of hills of an approximate height of 800 metres (2625 feet) above the sea (i.e. the general level of the plain of Patagonia in that region.) Properly speaking there is no pass between the Chubut and the Cholila valleys, but a depression of such a kind that the latter valley forms, so to speak, the southern prolongation of the former."*

The Surveyors to be appointed by Her Britannic Majesty's Government will, no doubt, confirm this last observation. That which the Chilian Expert calls "Cordilleras Lelej and Esguel," is but a short lateral ridge of secondary importance, running north and south, from the opening of Cholila to that of Esguel, apparently separating the northern prolongation of the 16 de Octubre valley from the Lelej valley. It is said "apparently," because, as a matter of fact, the Valley of 16 de Octubre is connected with that of Esguel, and Esguel valley is itself the southern continuation of Lelej valley, which latter unites with that of Maiten, etc. *The ridge above mentioned rises isolated in the centre of a great general valley to the east of the eastern spurs of the Cordillera de los Andes, and contains summits such as Mounts Nahuel-Pan, Thomas, Teeka, Cuche, and others which will be enumerated later on.*

These are all to the east of this main chain, *entirely separated from the Cordillera de los Andes.* The Argentine Commission has surveyed this region,



MOUNT ESPOLON, 43° 13' S. LAT., AT THE MAIN CHAIN OF THE ANDES.

and the map, which is the result of these preliminary surveys, and the photographs herewith reproduced, *give an exact idea of what the dividing line as proposed*

by the *Chilian Expert* really is. He gradually goes further and further from the Cordillera de los Andes, until in some places he loses sight of it altogether. When on the ground it is not necessary to defend the Argentine line; the enormous mass of the Cordillera, through the central chain of which it is carried, is the best argument in support of it.

Meanwhile, comparison between Plates LXVIII., Fig. 2, and LXX., Fig. 1, already referred to, with Plate LXX., Fig. 2, will be convenient. The two first represent the summit of the Cordillera de los Andes and the *primary watershed of*



THE NARROWS OF THE FETALEUFU, WHERE THE ARGENTINE  
BOUNDARY LINE PASSES.

the Cordillera, the only possible boundary line according to Nature and Treaties, combining the common convenience of Argentina and Chile. Notwithstanding its imposing features, the Chilian explorers, contemporising with their chief, the Chilian Expert, call this summit the "*secondary ridge of the Andes*," while they recognise that there is the "massive and highest part of the Cordillera," that there exists a "series of snowy ridges," running "in a north to south general direction and attaining an elevation of at least 2000 metres (6562 feet)," that "snowfields



send their waters to both sides," on the west in the fluvial system of the Bodudahue and Renihue, and on the east to the fluvial system of Fetalefufu, thus showing all the physical characteristics given by geographers to the main chain of a great range of mountains. Plate LXX., Fig. 2, represents the landscape to the east of the foothills of the Cordillera, the valley of Cholila, the last eastern spurs of the Cordillera, the eastern ridge outside the range, and the low plains where the abnormal continental divide is produced, and which can only be considered as a *secondary local watershed*. In these plains the Chilean Explorers have



THE RIVER FETALEUFU AT THE NARROWS.

recognised that only depressions are to be seen such as those of the Cholila and 16 de Octubre Valley : but, notwithstanding this, the Chilean Expert has endeavoured to leave them within Chilean territory, considering them as situated to the west of the summit of the Andes ; and although they form the southern prolongation of the valley of Maiten, he tries to interpose between Maiten and Cholila, the main chain of the Andes, seeing in these plains a *principal divisory ridge dividing the waters of the South American continent*, converting the Patagonian plains into the high mountains of the Andes, contemplated in the

Treaties, and locating there some of the landmarks mentioned in the list that was contradicted by the Argentine Expert. A rapid glance at these plates will show which of the two Experts is in the right as to the conception and location of the main chain of the Cordillera.



THE RIVER FETALEFUFU AT THE NARROWS.

## CHAPTER XXII.

*Summary*—1. THE VALLEY 16 DE OCTUBRE.

2. ARGENTINE OCCUPATION OF THIS VALLEY.

### 1. THE VALLEY 16 DE OCTUBRE.

THE river Fetaleufu, before running towards the south-west and cutting through the main chain of the Cordillera, makes a great bend in an opening between Situación ridge and its southern prolongation, so as to penetrate into the broad Valley 16 de Octubre, at the eastern foot of the Cordillera. At this bend the Corintos river after winding its way across the valley, flows into the waters of the Fetaleufu, from the mountains of the Pre-Cordillera, which is there formed by the broken ridge extending to the south of the opening of Esquel. This valley, which has always been considered as Argentine, and where prosperous settlements under Argentine dominion and sovereignty exist, the Chilian Expert has attempted to include in Chilian territory when proposing his boundary line. For that purpose he has projected that line, as has already been said, across—

“The Cordilleras Lelej and Esquel, the opening of Esquel, the gap Nahuel-pau, Mount Thomas, opening Súnica, Mount Teca, the opening of Lake Cronómetro; the Caquel Range and Mount Cucho, marked with numbers 290 to 298, which separate the hydrographic basin of the Chilian river Fetaleufu from that of the Argentine river Chubut.”

The Record of August 29, 1898, where this sentence appears, is the first official Chilian document in which mention is made of the basin of the river Fetaleufu as Chilian territory: a mention which, as in many other points of Señor Barros Arana's line, can only be considered as the outcome of an error.

Of the northern sources of the river Fetaleufu, those of the east are in the plains of Cholila, those of the centre in the mountain mass of the Cordillera south of the river Puelo, and those of the west in the eastern spurs of the Andes from which the Fetaleufu receives its greatest quantity of water. The snows and glaciers of the summit of the main chain feed it, and over these snows

and glaciers the proposed Argentine boundary line is traced in accordance with the Treaties. The proposed Chilian line passes along the plain of Cholila, which is not in agreement with those Treaties, and thus continues towards the south. It is therefore important to show that notwithstanding the pretensions of the Chilian Expert, the longitudinal valley extending to the west of the broken ridges of Lelej, Esguel, Nahuel-Pan and Cucho, and to the east of the broken ridges of Rivadavia and Situación, is Argentine, as also are the regions watered by the upper course of the river Fetaleufu to the west of the last ridge.

Captain Chaworth Musters in 1870, in an account of his journey,\* says :—

P. 192.—“ After crossing several ridges and glens, we at length traversed a hillocky plain, of the usual scrub-covered aspect, and strewn with flint, agate and other pebbles, and encamped for the night in a place called ‘ Woolkein,’ situated by the side of a watercourse which was now nearly dry, the water only remaining in the deep holes. We had left the cañon or valley of the river Teckel a few miles east, from which point it appeared to give a sharp turn in an easterly direction.

“ To the west the mountains of the Cordillera were visible about twenty miles distant, while on the south were the rocky abrupt hills already passed over, and on the north a range of rather peaked hills running west, and appearing to slope at their western extremity towards the plains beneath the Cordillera. Next morning, before the rime was off the pasture, we were again *en route*, and after a rocky descent of perhaps fifty feet reached a second plain, everywhere strewn with stones, which rendered galloping very difficult; nevertheless, a large herd of guanaco were enclosed and numbers killed, while ostrich, on the contrary, appeared to be very scarce. To my great surprise, whilst running some guanaco, two large partridges got up from close to my horse’s feet, and flying a short distance settled again. Partridges had been described to me in the neighbourhood of Santa Cruz, but I had never seen one, and these were the first met with in the country. Towards three in the afternoon we emerged from the stony district to a plain covered with sand and scrub, and after refreshing ourselves at a rivulet, travelled westward, with the Cordillera in full front, till we turned a high cliff which jutted out from the grassy slopes in which the hills fell gradually down to the plains, and beyond it, turning again northward, entered a level plain, at the far extremity of which we observed with great contentment the answering smoke from the toldos of the Araucanian Indians. On the south-west edge of this valley the high beetling cliff obscured the view of the wooded mountains, which, however, showed out between the hills, shutting in the valley we had traversed up to this point. On the eastern side rose a range of hills, barren and desolate, with here and there a single guanaco in solitary majesty, cropping the stunted grass. In front of us, directly to the north, lay a large lagoon, in which numerous swans and flamingoes were wading and swimming about. Beyond it were visible the toldos of the Araucanians, ten in number.”

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\* At Home with the Patagonians, London, 1871.



This point was Esguel-Kaiken, and the Cordillera he mentions is the Situación ridge visible from the wide opening to the west. Musters in his mind was travelling along the east of the Andes, and it is evident that he never considered that its summit was determined by the water-parting, but by its colossal mass. In his journey that day he crossed the continental divide twenty miles to the east of the eastern foot of the Cordillera. The "peaked hills running *west* and appearing to slope at their *western extremity towards the plains beneath the Cordillera*," are the Esguel hills and the plains beneath the Cordillera, those forming the large valley 16 de Octubre.

Ten years after, Dr. Moreno visited the same regions as Captain Musters. On his way from Tecka to Esguel he reconnoitred the hills to the south of Esguel, crossing there "a chain of mountains, which in part form the line divisory of the waters which descend to the Atlantic and to the Pacific: a river was running in that last direction. These mountains commence at Queluja-Iquetre and end at Tecka, being about 2000 metres (6562 feet) high," and were considered by Dr. Moreno as forming the "Pre-Cordillera," which opinion he still sustains. The river flowing to the Pacific Ocean is the river Corintos, the eastern tributary of the river Fetaleufu.\*

Señor Moreno made his journey in fulfilment of a commission of the Argentine Government, and his information was taken into account when in the following year the Boundary Treaty was signed, in which it is laid down that the dividing line should run *by the Cordillera de los Andes along the line of its most elevated summits which may divide its waters*. It was then asserted that the broken ridges Lelej, Esguel and Tecka were *outside the Cordillera properly so called*, and that they can only be considered as belonging to the Pre-Cordillera, thus corresponding to the ridges lateral to the Cordillera in the Argentine provinces of Mendoza and San Juan.

Until 1898 the Chilian Boundary Sub-Commissions had not visited the Valley 16 de Octubre, and their work was only carried on to the east of the range. These Commissions obtained their stores from the commercial houses of Nahuel-Huapi where they crossed the mountains, or from those in Rawson or Trelew, that supply the settlers of the eastern foot of the Cordillera. *Not even*

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\* Moreno, Recuerdos de viage en Patagonia. Anales del Ateneo del Uruguay, tomo 2. Montevideo, 1882. Quelujaquetre was the Gennaken name of the valley between Maiten and Lelej.

*the most insignificant virtual has ever reached these regions across the impassable barrier of the Andes.*

Dr. Paul Krüger, member of the Chilian Exploring Commission of the Palena, visited in 1894 the colony 16 de Octubre, and describes\* the valley thus :—

P. 77.—“ The ascertaining of the geographical latitude and longitude of our camping place proved it to be in  $42^{\circ} 56' 1''$  S. and  $71^{\circ} 10' 5''$  W. at the entrance of the northern valley, at a height of 620 metres (2034 feet). The ascent of a mountain gave us a good idea of the topographical situation of the valley and of the Cordillera mountain chains. The valley runs between two openings (Boquetes), which join it with the Pampas; the northern one, 730 metres (2395 feet), which we passed, and the southern one, 600 metres (1968·5 feet), near the abode of the Inspector, and which has the form of an acute angle whose vertex is a mountain 1900 metres (6234 feet) high, called Cerro de Situación by the inhabitants of the valley. A Cordillera, running from north to south with the Mount Tomas, connects the two Boquetes and separates the valley from the Pampa situated on the east, and a line of heights extending towards the west occupies the space between the two valleys. All the brooks by which the valley is watered unite in the south-western corner at the foot of the Cerro de Situación and form a large stream, called Carrileufu by the Argentines, and named Staleufu by Fontana, and whose waters flow down to the western coast. Amongst these brooks the principal ones are the river Corintos, or Abacurrans, which flows from the Lake Rosario in the lower southern part and the Esquel in the north. The water-parting lies in the two Boquetes and the eastern Cordillera chain which connects them. This water-parting is the interoceanic one, so that, according to the Chilian-Argentine Boundary Treaty of 1881, the Valley 16 de Octubre belongs to Chile. From the top of the ascended Cerro de los Pablos, 990 metres (3248 feet), which is the highest peak in the northern entrance of the valley, several parallel chains of the western Cordilleras, as well as several deeply cut passes, are easily distinguishable.”

It is well to remember that Cordillera in the paragraph just quoted means mountain ridge, and not Cordillera de los Andes; and that the Argentine-Chilian Treaty of 1881 does not order that the boundary is to be the interoceanic water-parting, but the summit of the Cordillera. Dr. Steffen, chief of the same Chilian Exploring Expedition, has stated † :—

P. 53.—“ From the hills which border, on the north, the Valle Frio, there is a steep descent, but safe for transit on horseback, leading down into the beautiful valley 16 de Octubre, where for years there has been a flourishing colony of Welsh peasants, *which was established by a decree of the Argentine Government of September 13, 1886.*

“ From the representation in the map of the Engineer Ezcurra, this valley appears

\* Verhandlungen des Deutschen Wissenschaftlichen Vereins zu Santiago de Chile, vol 3, 1895.

† Ibid.

to be somewhat of the shape of an acute-angled triangle, of which the line of the base, from the north-east to south-west, is over 50 kilometres long (31 statute miles). According to Fontana, the colony is divided into lots of 25 kilometres each.\*

"Numerous streams, whose banks are covered with bushes, flow through the meadow land of the valley, and join their waters with that of a large river, which touches only the south-western corner of the 'Valle,' and which Fontana named the Staleufu, but which is now known by the colonists under the name of the Carrileufu.† This river comes forward out of a ravine of the Cordillera, separating from the central massifs the Cerro Situación (1825 metres (5988 feet), according to Ezeurra), and the Cerro serves as a landmark on account of its strange shape; immediately afterwards the river turns sharply to the west, and again joins the Cordillera.

"No one has hitherto sufficiently explored its course to the west, to be able to say to which system of rivers the Staleufu belongs. As before stated it can only be a question whether it constitutes the upper course of the river Frio, or that of another river, possibly the Chilian river Corcovado. Fontana already argued in favour of this last opinion, but Ezeurra ascribed it without hesitation to the system of the Palena, which therefore in its upper part, would have an enormous extension from north to south. It must, however, be remarked that Ezeurra's sketch rests only upon combination, although this is not apparent from the method of his representation. It is, however, evident that the Staleufu, and with it the river of the Valle del 16 de Octubre, empties itself into the Pacific Ocean, and, therefore, that also here the continental divide extends far away to the east, *through the central masses of mountains, to a low eastern chain of the Cordillera.*"‡

Dr. Steffen recognises that the continental divide extends far away to the east, beyond the central masses of mountains, i.e. to the east of the main chain of the Andes. Therefore, this "continental divide" is not the boundary of the Treaties, since this boundary must pass across the waters that cut the main chain, leaving that part lying to the east of it in Argentine territory.

Besides, it is also advisable to point out some errors into which the Chilian explorers have fallen, their opinions in regard to the physiography of the region which contains the Valley 16 de Octubre being not in accordance with the results of the Argentine surveys.

In the maps of Señores Fischer and Steffen already referred to (pages 542 and 569, Plates XV. and XXV.) there has been drawn to the north of the Valley 16 de Octubre, a ridge which seems to be of snow-capped mountains, and which

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\* Boletín del Instituto Geográfico Argentino, 9, p. 315. (Dr. Steffen's foot-note.)

† In order to avoid confusion we retain the name of "Carrileufu" only for the river so called unanimously by Serrano, Fontana, and Ezeurra, which represents the principal branch of the Palena. The colonists call this "Corcovado." (Dr. Steffen's foot-note.)

‡ See my essay "Sketches of my Travels in the Cordilleras of Llanquihue," in Petermann's Mittheilungen, 1894, p. 149. (Dr. Steffen's foot-note.)

runs towards the south-east of the western ridge of Mount Situación. This last ridge is depicted in a general direction towards the N.N.E., and uniting with a hypothetic Cordillera de los Andes, as the true one is not represented in them, that name having been given to the broken ridge to the east of the valley.

Such northern snowy ridge does not exist, nor does the second extend in the direction indicated, nor has it any other mountain with permanent snow on its summit than Mount Situación. Doctors Krüger and Stange have stated that the Valley 16 Octubre is only the prolongation of the Valley of Maiten, lying to the east of the ridge of Piltriquitron and, in consequence, to the east of the Cordillera de los Andes.

It has already been said that (as asserted by the present Argentine Expert in 1880 by the surveyors of the Museum of La Plata in 1896, by Doctors Krüger and Stange in 1897, and by the Surveyors of the Argentine Boundary Commission in 1898) where Señores Steffen and Fischer drew a range on their maps, there exists the fluvio-glacial terrace of Epuyen which the Chilean Expert mentions in his list with the name of Opening of Epuyen (No. 289). Moreover, it is well to state that in no one of the several official maps of the Chilean Commissions does there appear any indication of the Argentine settlement of 16 de Octubre, with the importance of which the Chilean Expert would not be unacquainted, it being the residence of Argentine authorities and the most important inhabited centre to the south of parallel  $41^{\circ}$  S. lat., except Rawson, Trelew and Gallegos, and Punta Arenas in the Straits of Magellan.

The Chilean explorers have declared several times that the Valley 16 de Octubre lies to the east of the Cordillera, or to the east of the main or central chain of the Cordillera; even those that consider that the ridge of Esguel and Tecka belongs to the Cordillera or to the *Andean system*, have acknowledged that along all this longitudinal valley from Maiten to the south, settlements under Argentine control exist, and that their existence dates from many years. Can these facts be omitted by the Chilean Expert, and ignored by him when drawing his boundary line? There is no justification in having thus proceeded against every physical, economical and political reason.

The Valley 16 de Octubre is the southern prolongation of the valleys Maiten and Cholila, as has been declared by the Chilean explorers; and better opinions in favour of the Argentine assertions cannot be quoted. If these three valleys form only a large one, there does not exist between them the Cordillera de los Andes, and the crest of this Cordillera is the only boundary agreed to as far as  $52^{\circ}$  S. lat.



That the Cordillera does not exist there is proved by Plate LXX., Fig. 1. which represents the range where it really is ; but even hypothetically accepting that the valleys Maiten, Cholila and 16 de Octubre do not belong to the same large longitudinal depression situated to the east of the Cordillera, the incorrectness of the pretensions of the Chilian Expert will all the same be apparent. The short ridge of Lelej and Esguel exists, there is produced the wandering and changeable "divide" of the continent, that is unquestionable, and Argentine explorers have been the first to mention this fact ; but what forms the "divide" to the south of this ridge, in the meadows and terraces of Esguel and Súnica-Paria, called by the Chilian Expert *opening of Esguel* (No. 291), *Gap of Nahuel-pan* (No. 292), *opening of Súnica* (No. 293), in the description of his line ?

Señor Moreno, in his journey of 1896,\* makes the following remarks on those points :—

P. 84.—" In these Esguel pampas we again meet with the *interoceanic divortium aquarum*, produced always by the above-mentioned cause—glacial action. Here also, the streams which flowed down from the Cordillera towards the Atlantic were, owing to the obstruction of their natural channels by the immense moraines with which the region is covered to-day, forced to seek an outlet into the Pacific. The great western glacier, forcing a passage between the mountain gorges preceding the first longitudinal fold in the hills parallel to the central Andean chain, has covered with its moraines the entire valley between the northern part of Apichig and Mount Thomas, filling this basin with other branches of the extinct Tecka glacier. In the account of my journey of 1880, I mentioned this enormous glacial deposit and the interesting frontal moraine of the Tecka at the converging point of the two narrow defiles—that of Esguel and that of Tecka. The glacial mounds increase in height towards the south, opposite the western gorge.

"After having walked more than 20 kilometres (12·4 statute miles) through an almost level plain, in which, without the proper instruments, it is impossible to determine where the streams flowing to the Pacific and to the Atlantic take their rise—a plain where one would seek in vain for anything which might be considered as an 'Andean watershed ridge'—one descends the great moraine in front by the gorge or gap of Esguel ('boquete,' according to Señor Fischer's map) and reaches another terrace of the ancient lake which no longer exists, its bed being now occupied on the west and south-west by the Colony 16 de Octubre.

"In his diary of the Rio Palena Exploring Expedition Señor Stange says, (page 157) that : 'the mountains situated on the west and south of the Esguel Plain form the dividing line between Chilian and Argentine waters, i.e., between those flowing to the Pacific, and those emptying into the Atlantic.' This is not the time to discuss whether

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\* Notes Préliminaires sur une Excursion aux Territoires du Neuquen, Rio Negro, Chubut et Santa Cruz, La Plata, 1898.

these streams are Chilian or Argentine, because they flow in this or that direction, but I may say that Señor Stange is incorrect in this paragraph, the result, doubtless, of the too cursory observations which his hurried journey enforced. The streams flowing east and west rise to the east and north of these mountains, in the plain, and there is no chain running from the west to the south-east as this traveller states to be the case. Seeing that this mistake is repeated on the map drawn by Señor Fischer which records the results of the exploration and which is quite inaccurate, I must not proceed any further without drawing attention to this fact, for such errors help to warp the judgment of those who are interested in the orography of the southern region of this continent.

"If the volume of the waters of the Esguel Plain should be unusually increased, which might be the case any winter, the interoceanic *divortium aquarum* would be removed further to the east of the point where it is now situated, and would no longer be formed by the Esguel Hills, nor by the plain. In this case the eastern plateau would, according to the theories of Señores Steffen, Fischer and Stange, become, 'the main chain of the Cordillera dividing the waters' during one season of the year, while for the remainder of the time this 'main chain' would be in the plain."

This Argentine opinion on the continental divide and the plains of Esguel and Súnica have been corroborated in 1897 by Dr. Steffen. In his Spanish Report to the Chilian Minister of Foreign Affairs, Worship and Colonisation,\* he only says in reference to this region :—

"On the 6th we started from the mines, and after having followed the river Corintos for a certain distance we again crossed the *divortium aquarum*, determined by the Gap of *Esguel* and a broad tableland which contains the lagoons without drainage of the same name."

But in the German description of his journey, he is more explicit on the matter.† He has said :—

"Lieutenant Horn and I had on April 6 left the mines. Once again we crossed the interoceanic water-parting on the wide plateau of Esguel, which contains a lake without outlet, the first clear example of the plateaux sunk in the water-parting zone and formed of doubtful drainage, the entrance of which from the Palena to the south appears to be abundant."

Plate LXXII., Fig. 1, represents the Esguel fluvio-glacial plains. In the first place it shows the well-preserved shores of the lost lake, the waters of which were captured by the streams eroding from the west. This change in the "divide" must have taken place in very recent times, so recent that it is impossible to fix

\* Informe preliminar sobre la expedición exploradora del Río Aisen (Diciembre 1896–Abril 1897) by Dr. Juan Steffen, Santiago de Chile, 1897, p. 110.

† Verhandlungen der Gesellschaft für Erdkunde zu Berlin, vol. 24, 1897, p. 470.

Mount Misas.

Mount Thomas.  
(1440 m.; 4724 f.)

Mount Nishupeta.  
(2000 m.; 6562 f.)

Mount Esquel.  
(1650 m.; 5414 f.)

Hills to the East of Esquel Plain.

Valley of Tecka.  
(550 m.; 1804 f.)

Tecka Hill.  
(1500 m.; 4921 f.)

Tecka Hills to the South and West.

FIG. 1



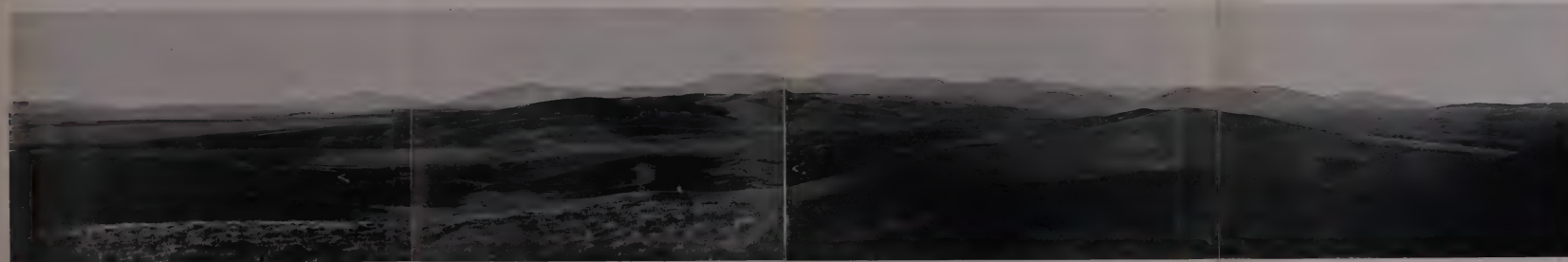
THE SUNCIA-PARIA FLUVIOGLACIAL PLAINS.

Mount Thomas.  
(1440 m.; 4724 f.)

Mount Nishupeta.  
(2000 m.; 6562 f.)

Esquel Ridge.  
(1650 m.; 5414 f.)

FIG. 2



THE PLAIN OF ESQUEL AND TEMENHUAO STREAM.

Plate p. 65.





it exactly at present. In this plate there can be seen the blocks forming the broken ridge of Minas, Thomas, Plomo or Nahuel-Pan and Esguel, and between the latter and the Teeka Hills, the broad transversal depression where formerly existed the outlet of the lost lake of Esguel. None of these hills can be considered in any way as forming the main mass of the Andes, as it has been drawn in the Chilian maps, nor do their orographical and geological features correspond to those of the Cordillera. They have no connection at all with it, but their character is the same as that of the Pre-Cordillera which has previously been referred to.

Plate LXXII., Fig. 2, contains the landscape of the plain of Esguel from the north from the southern terrace of the Temenhua stream, which, crossing the northern part of the plain, flows to the north-east as a tributary of the Chubut river. To the west is shown the ridge of Esguel which bounds the plain : to the north extends the fluvio-glacial terraces cut by the tributaries of the Chubut ; to the south-west are seen Mounts Nahuel-Pan and Thomas, and to the south the hills which in this region precede the Patagonian tableland. The stream running in the morainic undulations is the one which feeds the lagoons of Esguel, the outlet of which must be subterranean, a fact that has not been taken into account by the Chilian Expert, and which may have had some importance, being the point where his proposed boundary line runs, as in his opinion the main chain of the Andes must be located where the waters flow in opposite directions to the Atlantic and to the Pacific.

It is merely necessary to look at that plate to see that the vast plain of Esguel, upon which are reared thousands of cattle belonging to the Argentine Southern Land Company, *is not situated in the Cordillera de los Andes where the dividing line, in fulfilment of the Treaties, should be drawn.* There are only morainic deposits and fluvio-glacial terraces to be seen, which characterize the whole of these regions, and also terraces indicating ancient water-levels of large lakes and rivers now disappeared.

Plate LXXIII., Fig. 1, shows the same region from the opening of Nahuel-Pan, called opening of Esguel in the description of the Chilian line (No. 291). Through the open plain lying between the northern slope of Mount Plomo and the southern slope of Mount Esguel passes one of the roads connecting the Atlantic colonies of Chubut with the Valley 16 de Octubre, and the projected railway between both points will follow the same way. The little pointed hillocks are of recent volcanic origin, and there are visible *drumlins* in the plain, while

in the foreground are seen morainic materials surrounding basaltic lavas sculptured by the lost glacier. To the west of the opening can be distinguished the ridge of Mount Situación forming the eastern spur of the Andes, and between this ridge and the opening of Esguel there spreads out the Valley 16 de Octubre. To the north of Mount Esguel is seen the plain of Esguel, bounded by the horizontal fluvio-glacial terraces, and to the north-east and east extends the Patagonian tableland to the north of the transversal depression Esguel-Teeka. The right extremity of the figure shows the north-western slope of Mount Thomas, in such a manner that it gives an accurate idea of the character of Esguel and Nahuel-Pan openings, in the last of which the Chilean Expert tries to locate the landmark No. 292, pretending that it is a gap in the main chain of the Andes.

The Chilean line, after crossing the gap of Nahuel-Pan, reaches the top of "Mount Thomas," descends to the "opening Súnica," and continues by the summit of "Mount Teeka, the opening of Lake Cronómetro, the Caquel range and Mount Cucho," marked with the numbers 293 to 298, which points, according to the Chilean Expert, together with the "Cordilleras Leleg and Esguel," the "opening of Esguel," and the "gap of Nahuel-Pan," "separate the hydrographic basin of the Chilean river Fetalefufu from that of the Argentine river Chubut." In Chapter XXI. it has been demonstrated that the river Fetalefufu in that part lying to the east of the main chain of the Andes, along which the Argentine line runs, is totally Argentine by nature and law, and that only when these waters precipitate in rapids and cascades by the narrow gap cut across the main chain do they flow in Chilean territory. Therefore all the territory to the west of the Chilean line and to the east of the summit of the Cordillera in the region of the Valley 16 de Octubre is Argentine, and this conclusion can also be deduced from the observations of the explorers of the Chilean Boundary Commission. In the Spanish Report already quoted of Dr. Steffen,\* after describing his journey by the eastern plain, from the river Senguerr to the neighbourhood of the Teeka valley, he says :—

P. 108.—"After a long march by an unwatered plateau,† we descended on April 2 to the wide valley of the river Teeka, on the shores of which we found some houses and great

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\* Informe Preliminar sobre la Expedición Exploradora del Río Aisen.

† The rapid march of Dr. Steffen has made him fall into many errors: the fluvio-glacial plain which he calls plateau is watered by many little streams.

*Situación ridge.*

*Mount Esquel.*

*Esquel plain.*

*The table-land.*

FIG. 1.



*Mount Plomo or Nahuelpan.*

W.

THE OPENING OF ESQUEL AND THE TRANSVERSAL DEPRESSION ESQUEL-TECKA, FROM THE OPENING OF NAHUEL PAN.

E.

*Mount Langley.*

*Mount Plomo or Nahuelpan.*

*Esquel-Tecka transversal depression.*

FIG. 2.



*Fluvio-glacial terraces.*

THE BED OF THE DRIED-UP LAKE OF CORINTOS, NOW CALLED "PAMPAS DE CORINTOS," AND ITS TERRACES.

*Ancient outlet.*

*Fluvio-glacial terraces.*





herds of horses, sheep and cattle. We turned then to the north-west to ascend, by the glen of the river Caquel—the western tributary of the river Teca—and to cross the ridge which in that part marks the interoceanic *divortium aquarum*. The road comes first to a gap of about 1100 metres (3609 feet) of elevation,\* which cuts a rugged and desolate mountain; † descends to a plateau about 800 metres high, partially occupied by a lagoon, called the *Cronómetro* by the Argentines, and crosses afterwards the ridge which bounds the lake and the plateau, at a height of 965 metres above the sea. At that moment Cronómetro lagoon had no visible outlet, but there exists the dry bed of an outlet, which, according to the declivity of the ground, must have drained to the east; thus, only the second ridge we crossed, marks the continental divide.

“Looking from its top to the west, we saw, at about 350 metres below, the broad depression of the river *Corintos*, which runs for a considerable distance in a south-north direction, and turns afterwards to the west to join, in the south-west extremity of the Valley 16 de Octubre, the river *Staleufu* (or *Carrenleufu*, according to Argentine nomenclature), which loses itself in the interior of the *Cordillera*. All the valley is filled by enormous fluvial alluvia, disposed in regular steps which seem to show a general uplifting of the ground, while the river was deepening its cutting. We descended by a craggy slope, at the foot of which are the offices of the mines, where we were received with extreme amiability by the engineer, Señor Koch, and the administrators, Williams and Gilderdale.

“We took rest here a day and a half (April 4 and 5), and we obtained some information on the work of the gold-washing which continues to be carried on until the present with slight result, in spite of great pecuniary outlay. We also had news that Señores Fischer and Bronsart had made their way to the north, having examined the valley of the river *Carrileufu*, upper Palena, towards the Colony 16 de Octubre, and we supposed that from thence by hastening the march we should meet them in two or three days more on the road to Nahuelhuapi. However, in this we were mistaken, because at that moment they had not finished their surveys in the Palena, and they arrived at Corintos only three days after we had started for the north.”

In the German Report, also quoted, ‡ he has said :—

P. 469.—“After we had followed the Teca river for some kilometres further in a north-easterly direction, our caravan turned towards the north-west, through the canyon of its neighbouring river on the left, the Arroyo Caquel (a name which it has received since Musters' time) in order to ascend again the continental waterparting and reach the mining district on the river Corintos lying to the west of it, where we hoped to meet the second division of the expedition. The way led through a rough mountainous country to a pass about 1100 metres (3609 feet) high, over which a plateau was reached, which is in part

\* Above the sea-level.

† The mountain is the ridge between Tecka and Mount Cuche or Edwin; its average height is 1350 metres in the part described by Dr. Steffen, and its ruggedness and desolation has been hardly exaggerated; it is sufficient to say that this part of the road can be easily passed in a quarter of an hour.

‡ *Verhandlungen der Gesellschaft für Erdkunde zu Berlin*, vol. 24, 1897.

drained by a now dried-up lake, *which in rainy years drains towards the east* (Laguna Cronómetro in the Argentine maps). The interoceanic water-parting runs over a lofty chain which closes in the plateau and the lake towards the west, and which was crossed by a pass, 965 metres (3166 feet) high. From here there is a steep declivity of 350 metres (1148 feet) down to the highly interesting terraces of the valley of the river Corintos, which, after a long reach to the north, bends westward and joins the river Staleufu as it breaks through towards the Great Ocean from the extreme south-western corner of the well-known Valley 16 de Octubre. (Concerning the connection of this river (Staleufu) with the neighbouring river basins uncertainty still exists.)

"The upper Corintos valley has for some years enjoyed a certain fame as a Patagonian Eldorado. In the immense mass of alluvium on both sides of the river, as well as in some neighbouring valleys, gold has been found, and a syndicate, formed by German and English capitalists in Buenos Aires, has already spent large sums with a view to the development of this treasure. Generally speaking, however, the results do not appear proportional to the expenditure. In spite of many borings the gold-bearing stratum of the mother rock has not yet been found. We saw several machines working, the cost of the transport of which to this place from the east coast must have been very heavy. In the small houses of the mining colony we enjoyed the hospitality of a German-Argentine mining engineer, during the two days' rest that we were obliged to grant to our over-worked horses.

"We were disappointed in our expectation to meet our travelling companions in Corintos, as Señores de Fischer and V. Bronsart had turned to the north-west from the upper Jenua valley, and were, at the time of our stay at the mines, still at the upper Palena, having carefully studied its source district, in order to complete and improve as much as possible the results of our Palena expedition (summer of 1893-1894). Three days after our departure they entered Corintos, and then first learned that the first division of the expedition had passed altogether over the Cordilleras."

Neither in the Spanish nor in the German Report is it stated by Dr. Steffen that the regions which he describes in the passages quoted are situated in the Cordillera de los Andes; he shows on the contrary that the region is to the east of the Cordillera, since he says that to reach the river Corintos *the first division of the expedition had passed altogether over the Cordilleras*; and that he visited a part of this river far to the east of the point where it joins the river Fetaleufu, which is lost in the "*interior of the Cordillera.*"

Any one who visits the upper valley of the river Corintos, described by Dr. Steffen, will say that the ridges mentioned by the Chilian explorers are not the Cordillera de los Andes, nor the main chain of the Andes, and will agree with the Argentine Expert that this broken ridge corresponds to the chain called in the central and northern part of the Argentine Republic "Pre-Cordillera," and which is considered as a lateral chain independent of the Cordillera.

FIG. 1.



THE PAMPA OF CORINTOS FROM THE SOUTH.

*Mount Cénica*  
(2270 m.; 7448 ft.).

*Mount Sibacón*  
(2000 m.; 6562 ft.).

*Mount Bicodaria*  
(1840 m.; 6037 ft.).



VALLEY 16 DE OCTUBRE TO THE WEST, FROM PELADITO HILL TO VALLEY CARRÉN-LEUFU.

Photograph taken from River Percy (500 m.; 1640 ft.).





The map of that region shows that to the east of Mount Thomas and to the north-west of Mount Tecka is situated the wide opening of Súnica-Paria. The continental divide is there also indefinite, and only a slight undulation formed by glacial material, of an altitude of twelve feet, separates the little rivulets which run in opposite directions to the Tecka and to the Corintos in a nearly level sloping ground, where Argentine police posts have been established, and where exist farms the cattle of which pasture in the water-parting. If this water-parting were produced in the main chain of the Andes, in the summit of the snowy Cordillera, as Señor Barros Arana pretends, it would be impossible for cattle to pasture there. Another wagon road from Chubut to the Valley 16 de Octubre passes through that opening and is used like that of Esguel, by the colonists, as it does not cross any mountains or hills but only meadows, the shingle beds of ancient larger rivers and hillocks, and the terraced steps of the large lake, now disappeared, which once covered the present upper valley of Corintos. This lake flowed first to the east by the large bay of the transversal depression Esguel-Tecka, but after the saddle between Mount Thomas and the ridge of Minas and Langley was cut by the erosion coming from the west, it changed its drainage, and emptied in the lake that formerly occupied the present Valley 16 de Octubre.

Plate LXXIII., Fig. 2, shows the bed of the former lake called to-day "Pampa de Corintos," and the several level terraces of its old shores, comprised between the ridge of Mounts Nahuel-Pan and Langley to the west, and the ridge of the east called by Dr. Steffen "dividing ridge." It is possible to distinguish eight well-defined steps, the origin of which, whether they are the result of uplifts combined with climatic phenomena and changes of outlet, or only due to climatic phenomena and the capture of the waters from the deepest lacustrine hollows, situated to the west, this is not the place to discuss. The examination of this figure and that of Plate LXXIV., Fig. 1, make it manifest that it is impossible to accept that the main chain of the Andes is situated there, as there only exist loose rocks formed by the boulder clay layers on which, owing to climatic condition of the region, erosion advances yearly to the east, pushing slowly the "divide" to the plains of the transversal depression of Tecka.

The river Corintos, having cut the low rocky saddle, now runs down to the Valley 16 de Octubre. To penetrate into this valley from the east, it is necessary, according to the quoted Chilean maps, to cross the Cordillera de los

Andes : but nothing is farther from the facts. Those who look to the west, from the hillocks crossed by the road of Súnica and 16 de Octubre, having arrived there by the picturesque little valley from the opening of Nahuel-Pan, or by the road of Esguel, have in front of them at the other side of the Valley 16 de Octubre the ridge culminating in Mount Situación, 2040 metres (6693 feet), which commands this longitudinal depression, and separates it from the eastern slopes of the Cordillera.

The Situación and Rivadavia ridges, separated by the hollows of Lake Feta-



MOUNT SITUACIÓN.

(From one of the farms in the Colony of 16 de Octubre.)

lafquen,—at the western foot of which runs the river Feta-leufu,—may be considered as belonging to the Cordillera de los Andes, but though they have patches of snow on the culminating peaks, they are of a very secondary importance in comparison with the majestic main or central chain.

It has been stated that the Valley Maiten-Cholila is prolonged to the south, the Valley 16 de Octubre being a continuation of it, in which opinion the Chilian explorers agree, and the panorama from the top of Peladito hill, an

isolated high hill (1340 metres, 4396 feet above the sea) which rises in the undulating valley, has been exhibited. To the south of Peladito hill the valley has the same character as the section Cholila-Maiten; the river Percey running to the west of that hill, and receiving the greater quantity of its waters from the eastern slope of Mount Rivadavia and the lesser from the western slope of the ridge Lelej and Esguel, crosses the fluvio-glacial deposits which cover the ancient bed of the former great lake which in pre-glacial times occupied this part of the eastern longitudinal depression. The river winds its way across very well preserved terraces, which so clearly show the fluctuations of the old lake and its outlets that the settlers give them the name of "railway embankments." As the river advances to the south the different levels become wider; it receives from the east the Esguel stream, and it reaches the lost bed of the former lake, in which the Colony 16 de Octubre has principally sprung up. There, in this fertile hollow, the river Percey, which has a north and south direction, joins the river Corintos which flows from the east, and the waters of both soon empty in the eastern bend of the river Fetaleufu, after crossing a swampy plain.

Plate LXXIV., Fig. 2, gives a good idea of the cultivated part of the valley. It comprises the western side from Mount Rivadavia to the neighbourhood of the river Carrenleufu, far to the south, and also shows why the Chilian explorers have never said that the Valley 16 de Octubre is situated in the interior of the Cordillera de los Andes, but have stated that it lies at the eastern foot of the Cordillera.\* This is the impression that everyone would have who knew this extensive valley, and only preconceived views on boundary lines in a mountain range, and a persistency in attempting to sustain what is unsustainable, may have led the Chilian Expert to say that this valley is situated within the Cordillera de los Andes, and to the west of the main chain—the "immovable boundary" according to the Treaties of 1881 and 1893.

Towards the south, the colony is bounded by terraces more or less denuded of woods, and covered with great quantities of glacial material, reaching 780 metres (2461 feet) above the sea, at which height a large lateral moraine at the present time separates the waters running to the hollow of the valley where flow to-day the rivers Corintos and Percey, from those which flow to the river Carrenleufu which have eroded the loose material of the former fluvio-glacial

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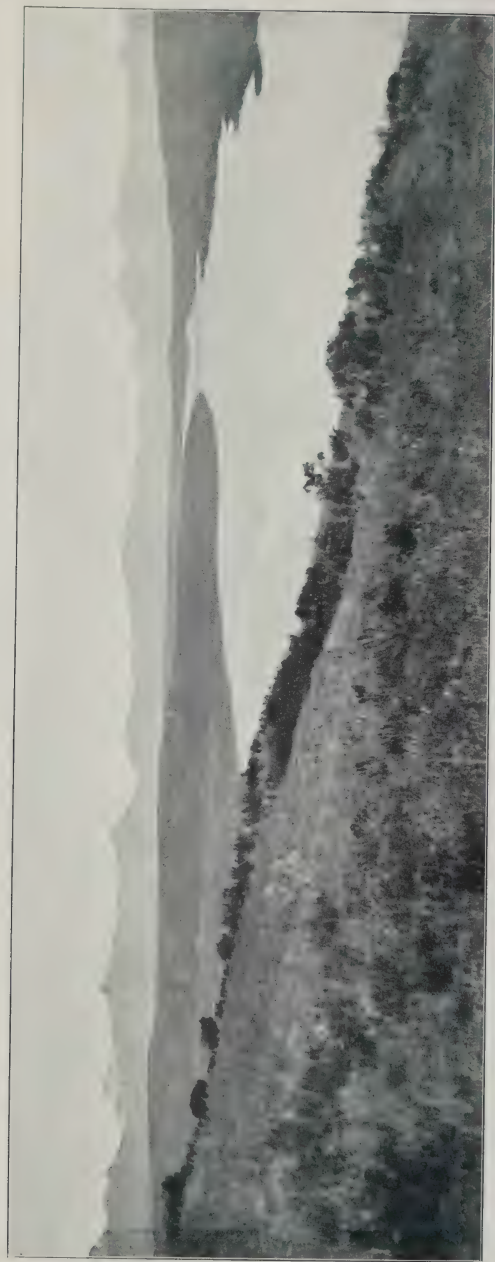
\* Dr. Steffen quoted on p. 545.

accumulations in the longitudinal eastern depression extending from Maiten to the south-east of General Paz Lake.

In this glacial deposit, at the western foot of Mount Langley, in an opening which reaches the source of the river Corintos, lies Lake Rosario, the waters of which flow to the W.N.W., forming a tributary of the same river Corintos, into which they empty near the bend of the river Fetaleufu (Plate LXXV.). Close to the south of this lake are the sources of the river Frío, which, cutting the boulder-clay of the terraces, runs to the south-west and forms the northern affluent of the river Carrenleufu, the north-western branch of the system of the river Palena. Between the waters which flow at the eastern foot of the Cordillera to the Fetaleufu and those which drain to the Carrenleufu there does not exist any permanent barrier. Erosion is at work cutting into the terraces which have the same general level as the great valley from Maiten to the south, and the glacial accumulations that cover these—shown in the Plate—indicate a very recent modification of the continental drainage. These clefts prove that the waters which carried this material formerly run to the east from the high mountains of the west, which reach in some peaks the heights of 1640 metres (5381 feet), 2040 metres (6693 feet), 1800 metres (5906 feet), 2000 metres (3562 feet), 1940 metres (6365 feet), 2100 metres (6890 feet), culminating in Mount Cónico, 2270 metres (7448 feet), and that the change in the direction of the rivers depends only on secondary phenomena, which do not modify the great topographical features or the general primary watershed located in the main chain at the summit of the Andes.

This summit, i.e. the top of the ideal fan-shaped structure of the range imposed by tradition, is, in spite of all the efforts to deny it, clearly and unmistakably manifest if viewed either from its eastern or western side, carved into peaks, domes, and wind and water gaps; while the broken ridges and isolated hills to the east of the tectonic longitudinal eastern depression which constitutes to-day the valleys Nuevo, Maiten, Cholila, 16 de Octubre, Carrenleufu, etc., from 41° to the south, are quite independent of this summit, lying entirely outside the Andes, to the east of the range, in territory under indisputable Argentine control, but where the Chilian Expert has attempted to locate his landmarks Nos. 290 to 298.





LAKE ROSARIO AND THE FIRST RIDGES OF THE CORDILLERA DE LOS ANDES (TO THE WEST).



## 2. ARGENTINE OCCUPATION OF THIS VALLEY.

The Valley 16 de Octubre, as already said, has been permanently under the dominion of the Argentine Republic who, being aware that her rights, inherited from Spain, extended as far as the edge of the Cordillera Nevada, and that her sovereignty up to the summit of the main chain of the Andes had been acknowledged in the Treaties, never hesitated in governing her own lands and the inhabitants settled therein, according to the principles enacted in her laws.

In 1882-83, Argentine military detachments reached, not only the Pre-Cordilleran valleys, but the neighbourhood of the Senguerr plain, crossing and re-crossing the continental divide in every direction, but without reaching the foot-hills of the Cordillera; and no question was ever raised as to the exercise of Argentine jurisdiction over these districts, the crest of the west, covered with perpetual snow, having always been considered as the boundary.

When at the end of 1885, the Governor of the Territory of Chubut—the western limit of which is the summit of the Andes—visited the region to the west of this same “divide,” it is evident that he did not think that he had passed from Argentine to Chilian territory, as he expressed his admiration for the boundary barrier of the Cordillera. The Governor, Señor Fontana, after camping in the valley of the river Tecka, called by him the river Charmata, crossed several terraces covered with shingle at a level of fifty metres above the river, and when reaching the top of a hill, 200 metres in height, he had before him the same scenery witnessed by Dr. Moreno—the lagoon of Súnica Paria undoubtedly—and further on, green meadows, woods and rapid streams. The landscape was extremely beautiful, strawberries and variegated flowers covering the ground. Señor Fontana was, as he says, in the “mountains of the Pre-Cordillera.” Passing the first valley, Señor Fontana and his companions, the Welsh colonists of the Chubut, arrived at another where the river flows to the west, which was called by him Valley of Corintos, and the high hill to the north of it was called Mount Thomas, in honour of one of the ablest Welsh colonists. He then penetrated to the broad valley which he named “16 de Octubre,” the date of the Argentine decree organising the territory. Señor Fontana says, in his Report to the Argentine Government, that this valley is situated at the “foot of the Andes,” and described the river Coreovado—which he thought was formed by the seven rivers which flow through the valley—as “crossing the

Andean chain," and losing itself in the Pacific, in the Gulf of Corcovado. In the sketch of his journey the river is shown as cutting the "Cordillera Real." The river Corcovado of Fontana is the same as the river Fetaleufu, a name which has replaced the former, as this was applied before to another river which rises in the western slope of the range. The photograph accompanying the Report of Señor Fontana shows that he reached the big river at the bend previously mentioned, to the east of the Andean summit. Señor Fontana continuing to the south in the wooded valley, discovered another river eighty metres wide, cutting the gigantic Cordillera, which is the Carren-leufu.\*

When the expedition returned to the Valley of Chubut, the colonists who took part in it resolved to found, in the Valley 16 de Octubre, a settlement connected with the prosperous ones of Rawson and Gaiman, and with the permission of the Governor the settlement was formed, wagons were carried to the foot of the Cordillera, and it was so well managed that in the early part of 1888 it numbered 159 inhabitants, who had expended 10,000*l.* on their installation.

The Argentine Government confirmed the settlement by decree of September 13, 1888, when fifty families were authorised to form a colony there, each family being allowed to occupy 2500 hectares of land.

By a Resolution of September 4, 1891,† it was decided to grant to each settler 100 hectares as a gift, with the option of buying 300 more, and by the message of September 11, 1895, the Government asked the Argentine Congress to sanction a gratuitous grant of 2500 hectares to each of the original families or founders in the valley. At this moment the colony has 4913 cattle, 3900 sheep, and 488 horses.

This settlement was never opposed by the Chilian Government, who were not unaware of its existence. The only Chilian representation against Argentine acts of jurisdiction in Patagonia referred to regions to the west of the *divortium aquarum of the Andes*, and was that of 1889, before mentioned (page 736), which had not a direct bearing on the colony 16 de Octubre. The Chilian Government when thus acting, erroneously considered that the Argentine Government, in selling to the Argentine Southern Land Company Limited, 289 leagues, with option to select them between 41° and 44° S. lat. and

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\* See *Viage de Exploración en la Patagonia Austral* by Luis Jorge Fontana, Buenos Aires, 1886.

† See *Registro Nacional*, 1891, vol. 40, p. 231.



69° and 72° W. long. of Greenwich, encroached upon Chilean territory. The Argentine Minister for Foreign Affairs said on that occasion that any act of jurisdiction in that part of the Cordillera of doubtful dominion, should not affect the results of the boundary demarcation according to the Treaty of 1881 : but as the "Valley 16 de Octubre" to the east of the Cordillera was not in territory of doubtful dominion, the Argentine Government continued to encourage its settlement as well as that of the neighbouring valleys, without taking into account whether they were situated to the east or to the west of the continental



A FARM IN COLONY 16 DE OCTUBRE.

divide, the fact of lying to the east of the summit of the main chain of the Cordillera being sufficient to characterise them as Argentine territory, in which no possibility of foreign intervention might exist. Neither the Chilean Government nor the Chilean Expert had, until the meetings of August and September 1898, ever supported the idea that this and the other valleys west of the continental divide were situated to the west of the main chain of the Cordillera de los Andes, and therefore, in Chilean territory ; but when the Chilean Expert declared that the main chain of the Cordillera de los Andes rises in the points

marked in his line with numbers 290 to 298, and that this line was traced within the Cordillera de los Andes, the Argentine Government, having deep respect for international good faith, agreed to submit to arbitration the Valley 16 de Octubre, as to whether, according to the Arbitrator, it is situated to the west or to the east of the main chain of the Andes, the highest summits of which constitute the boundary between the Argentine and Chilian Republics.

Before the meetings of the Experts in Santiago in 1898 (about the middle of that year), the Chilian Representative at Buenos Aires asked for explanations respecting some Resolutions of the Argentine Government, and the latter replied that all concessions of land had been made to the *east of the Cordillera de los Andes, and therefore outside any area in dispute.*

The Argentine Minister for Foreign Affairs replied\* to the Chilian Minister as follows :—

“The second charge is based upon the fact of the Argentine Government having measured and granted concessions of lands to the west of the line dividing the waters between parallels 42° and 46° S. lat., as appears from several plans comprising various valleys of affluents of the Aysen, Palena and Fetaleufu rivers.

“The Argentine Government has had measurements made and has granted concessions between parallels 42° and 46° S. lat., of lands the dominion of which has not been considered doubtful according to the letter and spirit of the Treaties, since according to the spirit of the Boundary Treaty, the Argentine Republic retains her dominion and sovereignty over all the territory that extends to the east of the main chain to the coasts of the Atlantic, just as the Republic of Chile does over the western territory to the coasts of the Pacific (Article 2 of Protocol of 1893); and being to the east of the Cordillera de los Andes, the Governments of the Argentine Republic and of Chile shall exercise full dominion and for perpetuity (Article 6 of Treaty of 1881).”

The sketch inserted herewith shows the apportionment of land in the Colony 16 de Octubre soon after its foundation, but there are many other settlements in the neighbourhood as the Chilian explorers have recognised in their different Reports. The Argentine decrees authorising these settlements, as well as the concessions of mines, sales or renting of lands, have been widely published without the Chilian Government ever having raised any opposition or objection. In 1892, the colonists discovered gold in the region crossed by the upper course of the river Corintos, and immediately mining concessions were made by the Argentine Government. In the Reports of the Chilian Exploring expeditions

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\* Memoria de Relaciones Exteriores de la P.A., 1899, p. 167.



to the river Palena, before quoted, are noticed these discoveries and concessions, which were ratified by the Argentine decree of June 13, 1896. The mines are worked by an Argentine Company.

In 1894 the Argentine Government sold a large area of land in the neighbourhood of these concessions and subsequently made other sales, consisting of lands to the west of the continental *divortium aquarum*. All these acts were officially published at the time without receiving or exciting, it must be repeated, the least observation from the Chilian Government, until the Chilian Expert attempted to leave within his country *the whole of the Argentine Colony "16 de Octubre," and all the settlements which have sprung up in its neighbourhood*, under the protection of Argentine law, and which never had, nor could have in the future, communication with Chile, owing to their being completely shut off by the great range of the Cordillera.

It never occurred to any member of the Argentine Government that when allowing these lands to be occupied, they did so to the prejudice of Chile. The colonists have before them to the west the snowy Cordillera, the real boundary, and to the east, the plain with easy roads, where the Chilian Expert tries to trace the frontier.

It is unnecessary to quote the many Chilian Reports which acknowledge the Argentine occupation of the Valley 16 de Octubre. There is not the shadow of a doubt on this point. Nevertheless it is well to remember that Dr. Krüger\* has said :—

P. 78.—“The inhabitants of the valley—about fifty people—are from Wales, and settled here only a few years ago and raise cattle. Each colonist owns one square league of land upon which a dwelling and an enclosure for cattle have already been erected. They are friendly but reserved because every stranger appears to them to be a competitor for their rich lands. At the head of this flourishing colony there is an Argentine Commissioner, Martin Underwood, who gave us all desired information willingly and obligingly. On January 30 our camp was moved to the neighbourhood of his house ( $71^{\circ} 14' 9''$  west,  $43^{\circ} 5' 4''$  south, 400 metres (1312 feet) above the sea-level).”

Dr. Steffen, whose observations have already been pointed out, has once more recognised the Argentine political control in a passage in which he states that the line of the continental water-parting is not to be found in the Cordillera

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\* Verhandlungen des Deutschen Wissenschaftlichen Vereins zu Santiago de Chile, vol. 3, 1895.



de los Andes in its main chain, but in cordons that detach from its principal mass. After having dealt with the colony,\* he says :—

P. 60.—“Strictly applying the fundamental provisions of the Treaty, there can certainly be no doubt whatever that this valley (16 de Octubre), as well as the ‘Valle Nuevo,’ which are the most fertile regions in all Patagonia, would remain to Chile, since it is situated to the west of the line of heights dividing the waters, which runs along well defined cordons *that detach from* the principal mass of the Cordillera.”

In order to deprive the Argentine Republic of her settlements lying within territories incorporated into civilisation through her own exclusive and persevering efforts, in order to cut off from her regions swayed by her laws and where her civil functionaries reside, it is sought to carry the line, according to the expression of one of the ablest Chilian employees, not along the main chain of the Cordillera de los Andes, but along cordons “*that detach from the principal mass of the Cordillera.*”

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\* Zeitschrift der Gesellschaft für Erdkunde zu Berlin, vol. 32, 1897.

## CHAPTER XXIII.

- Summary*—1. THE CORDILLERA DE LOS ANDES IN THE REGION OF THE CARRENLEUFU.  
 2. EXPLORATIONS OF THE CHILIAN OFFICER SEÑOR SERRANO MONTANER.  
 3. THE CHILIAN EXPLORING EXPEDITION OF THE PALENA.  
 4. THE PROPOSED ARGENTINE AND CHILIAN LINES IN THIS ZONE.

### 1. THE CORDILLERA DE LOS ANDES IN THE REGION OF THE CARRENLEUFU.

THE proposed Argentine boundary line runs, as already said, along that section of the main chain of the Andes, which, to the east, sheds its waters to the upper course of the Fetalefufu, and to the lakes which feed it, and to the west, to the valley where flows the lower course of that river,—there named the river Yelcho. In its prolongation towards the south, the line cuts across the narrow gorge situated at the tectonic fracture, now occupied by the river. It then ascends the lofty mountainous mass which constitutes the continuation of the main chain.

The Chilian explorer Dr. Krüger has given an account of his journey in the western region of these mountains, and it shows that this stretch of the international frontier is also impassable. Dr. Krüger \* says :—

P. 324.—“The upper course of the river (Corcovado) flows through two defiles, formed by deep clefts through the mountains, and leaving a space of only 20 to 30 metres (65 to 100 feet) for the river bed. Impassable ravines and valley-walls here require arduous circuitous roads on which often a root, a branch, or a stone would save one from falling by the precipice.

“In the last defile, which is distinguished by vast rocky landscapes, the expedition had to suffer a three days’ torrent of rain, accompanied by a hurricane, which produced such a condition of things as cannot even be surpassed by months of winter rain. Shivering with the damp we here spent forty long hours in our sleeping sacks. . . .

“On February 25, we reached an expansion of the valley which closes with a large

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\* Verhandlungen der Gesellschaft für Erdkunde zu Berlin, vol. 25, 1898.

glacier. This forms the source of the river Corcovado, and descends to the comparatively low altitude of 600 metres (1970 feet) above the sea-level. In spite of the great volume of water which the stream sends to the ocean, it has a comparatively short course, and, like the river Vodudahue and the river Reñihué, drains the *central mountain chain* towards the west. The important tributaries which were explored during the next two weeks, and were named river Menor, river Verde and river Nevado, also originate in glaciers.

"It was possible to ascertain that the whole Corcovado region is bounded by a steeply sloping Cordillera which reaches a height of 2000 metres (6560 feet), running in a north and south direction at a distance about 50 kilometres (30 miles) from the coast. It forms in the neighbourhood of 43° S. lat. *an uninterrupted snowy range, and makes any further advance eastwards impossible.* The expedition climbed several mountains, among them the highest of this region, the Cerro Cuatro Pirámides, to a height of 1450 metres (4750 feet), in order to obtain information regarding the country to the east; but the steadily dull and rainy weather prevented all view. A pass leading to the east could not be found."

The map containing the survey of Dr. Krüger \* represents the orographical conformation of these mountains and their numerous glaciers and snowy peaks, 2000 metres (6562 feet). If this map is compared with one of the eastern side, where the Chilian explorers try to locate the principal ridge dividing the waters of the Cordillera, it will be seen that the words "Intermediary Ridges," † given to the high mountains where the Reñihue and Corcovado rivers rise, are misleading, as these mountains form the true main and central chain of the Andes. It is worthy of notice that, in many cases, these "intermediary ridges" of the Chilian maps are considered to be the main or central chain of the Cordillera in the reports published by the very same persons who draw these maps.

The difficulties which Dr. Krüger met in his journey can better be appreciated when it is remembered that he took a fortnight to advance thirty miles. This part of the western slope of the Cordillera is extremely damp, rain falls nearly every day during the whole year, and it is owing to these unfavourable conditions that the development of settlements in this region has been impeded, as stated by Dr. Steffen (page 544).

The main chain continues with high alpine character, and its culminating point more to the south—the snowy peak Mount Blanco—corresponds with No. 290 of the Argentine line. At the southern foot of this mountain flows, from the east, the north-eastern branch of the river Palena. The line in its

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\* Los rios del Golfo Corcovado y las regiones vecinas de la Cordillera, by Pablo Krüger, Santiago, 1898.

† Serranías Intermediarias.

prolongation from the summit of Mount Blanco to the summit of Mount Serrano—another snowy peak in the main chain—cuts that branch, and the point where the cutting occurs is numbered 291 in the Argentine proposal.

The western base of the Cordillera is here separated from the western chain of the high volcanoes which dominate the Pacific, by a deep longitudinal depression extending for a long distance towards the south, and which, no doubt, is the result of earth movements, as are the depressions of Maricunga, Cura, Castaño, Los Patos, Tunuyán, etc., which generally divide the Cordillera de los Andes into two chains—eastern and western.

To the north, the western chain forms, as before stated, the greater part of the boundary chain; and to the south, the eastern chain becomes the dividing line, and continues as such up to the extremity of the continent, as it is more continuous, more uniform in its features, higher, and sheds more waters down the two general slopes of the Cordillera; while the western chain presents more breaches, and penetrates sometimes into the waters of the Pacific, forming its islands. The last cannot, therefore, serve as a boundary according to the Treaties, whilst the eastern chain offers special suitability for this purpose. The Argentine Government has never claimed to carry the frontier as far as this sea-board chain; it would have been as contrary to the letter and the spirit of the Agreements to carry it to the west of the main chain of the Cordillera, as it is contrary to that letter and that spirit to carry it to the east, as the Chilean Expert pretends.

## 2. EXPLORATIONS OF THE CHILIAN OFFICER SEÑOR SERRANO MONTANER.

Mention has already been made of the explorations in the river Palena, in 1885 and 1888, by the Chilean Naval officer Señor Serrano Montaner, which extended as far as the western part of the longitudinal valley of Carren-leufu, and 16 de Octubre to the east of the Cordillera. Señor Serrano Montaner has been in Chile one of the most prominent opponents of the Argentine and true interpretation of the Treaties. He rightly considers that the boundary must be traced in the Cordillera de los Andes, but erroneously maintains that the broken ridge and the tableland that rises on the north-east and east of the valley *belong to the Cordillera de los Andes*, and that since in these hills and terraces the *divortium aquarum* of the Cordillera occurs (*which is a mistake*), this ridge must



be the boundary. There are, however, contradictions in his statements, for as the mass of the Cordillera is so great, he could not do otherwise than consider it as the true Cordillera, thus agreeing with the Argentine Expert.

There can be no doubt that if Señor Serrano Montaner had extended his exploration of the Carrenleufu a few miles further on to the east and south-east, following the river, he would not have fallen into the error of taking the edge of the tableland for a ridge of the Cordillera, a mistake which, due to the same cause, was also made later on by Dr. Steffen.

Señor Serrano Montaner affirms that there is not a single tributary of the Pacific which rises in the east of the Andes, nor a single tributary of the Atlantic which rises in the west of the Cordillera; and this affirmation, resulting from incomplete knowledge of the upper course of the river Palena, has contributed to the erroneous opinion held in Chile on the nature of the boundary controversy. Señor Serrano writes\* :—

P. 5.—“Before proceeding, and since great importance has been given to the expression continental *divortium aquarum*, which is attributed to the Chilian Expert, it is well to clearly establish that if by these words it must be understood the line of the continent which separates the waters flowing towards the Pacific from those tributaries of the Atlantic, these words are synonymous with *divortium aquarum de los Andes*, as it is well known that from the Isthmus of Panama down to the Magellan Straits, the *divortium aquarum de los Andes* separates through all its length the waters tributaries of the Pacific from those of the Atlantic. There does not exist a single river tributary of the Pacific that has its origin at the eastern side of the Andes, neither is there a single tributary of the Atlantic the sources of which are at the western side of this Cordillera.

“It may happen, and it is sometimes the case, that there are rivers of the Pacific the sources of which are found in the eastern ridges of the Andes, but always within these Cordilleras, just as there are Argentine rivers, tributaries of the Atlantic, which rise within cannon range from the Pacific, but not beyond the boundaries of these mountains.†

“We could indicate one by one the springs of the Argentine and Chilian rivers, and we should not meet with any exception to the rule mentioned. The existence of two different lines separating the same waters and passing by the same points being impossible, the two expressions referred to signify one and the same thing, and we could use them indifferently, the one or the other, but we would adopt that of the *divortia aquarum* of the Andes, as this is the one employed in the Treaty of 1881, and that which has been always employed from the beginning of this question.”

Nevertheless, in some accounts of the exploring expeditions, it is stated

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\* Límites con la República Argentina, Santiago, 1898.

† Señor Serrano Montaner must allude to a tributary of the river Gallegos, in the vicinity of Obstruction Sound, near 52° S. lat.

that Señor Serrano Montaner *completely crossed the Cordillera*;\* and in the book quoted in which the explorer himself has collected his different publications on the Argentine-Chilian boundary question, the clearest proof is found that in reality the river Carrenleufu, the chief tributary of the river Palena, *cuts the whole of the Cordillera de los Andes*.

Plate 1 of the said book shows "*the eastern ridge of the Andes* which determines the anticlinal line." The first of the photographs it contains is that of this chain, seen from the west, but from the eastern side of the Cordillera. The most cursory examination suffices to show that this plate does not represent an Andean ridge at all, but merely the hills to the south of Mount Cucho, which disappear in this direction, and which are at a long distance to the east from the valley of the river Carrenleufu. The indication of the basin of the lake from which the river rises is erroneous, as this is in reality at a great distance from the spot marked. Photograph 2 shows the river on entering the eastern spurs of the *central ridge* of the Andes, which is seen in the distance. If the two photographs are examined it will be found that the so-called *eastern chain of the Andes* of Serrano Montaner—which is also that of the other explorers in the service of Chile who have followed his opinions—lies at a much greater distance from the *central chain of the Andes* than that which separates the *Cordillera de la Costa* from the *Cordillera de los Andes* in the region of Santiago. Nevertheless, the cities of Santiago and Talca in central Chile, situated in the central valley to the west of the *Cordillera de la Costa*, are not considered by any Chilian geographer, as situated in the Cordillera de los Andes. Therefore, the standard of opinion of those geographers varies according to circumstances. When dealing with the western central valley, they consider it outside the Cordillera, but when the eastern region is at stake, they try to extend the breadth of the Cordillera as much as it is necessary in order to include within it the Argentine eastern valleys. Photograph 3 is a "*Panorama of the central ridge of the Andes* seen from the east in the banks of the Carrileufu (Carrenleufu)," which ridge is no other than the main chain of the Cordillera, such as it was considered by the Argentine Expert when planning his line. A mere comparison of Señor Serrano Montaner's photographs would enable the Tribunal to appreciate which is the main chain of the Andes, along

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\* Globus, vol. 51, 1887, p. 304; Petermann's Mittheilungen, 1887, vol. 33, p. 253; already quoted on p. 238 and following.

which, in accordance with the Agreements, the boundary line must be sought.

In Señor Serrano Montaner's Plate II.—which contains four views of landscapes in the region of the central chain—may be seen the high snow-

Esploracion Serrano

Plancha III

# VISTAS DEL PALENA I CARRILEUFU



1. Río Carrileufu: Vista tomada desde el campamento 20 hacia el Este.—2. Boquete del Carrileufu: Vista tomada desde el campamento 17; (1) Monte Maldonado.—3. Río Bata-Palcna: Vista tomada desde los primeros rápidos hacia la boca; (1) Botes de la «Magallanes».—4. Valle Bata-Palcna: Vista tomada desde el campamento 4 hacia el NE; (1) Monte nevado del cordón central de los Andes, que el río rodea por el Norte.

SERRANO MONTANER, 1898.

(From Límites con la República Argentina, Santiago.)

capped “*Mount Maldonado, one of the most easterly peaks of the central chain,*” and gorges like that which cuts the Argentine line in its prolongation to the south are to be found.

Señor Serrano Montaner's Plate III. is characteristic. Photograph No. 2 on this plate shows the “*Boquete Carrileufu*” with Mount Maldonado, *where*

the Argentine line crosses; and No. 4 bears the inscription "*Valle Buta-Palena*. View taken from camp 4, towards the north-east; (1) snow-capped mount of the central ridge of the Andes which the river surrounds on the north, WHEN CROSSING THE CORDILLERA" ("*AL ATRAVESAR LA CORDILLERA*"). The last four words have been struck through with a line in black ink but can be easily read in all the copies of the book which have been consulted. The annexed facsimile of this plate renders further comment needless. In Señor Serrano Montaner's Plate IV. the central snowy chain is shown lengthwise, the same as in Plate VI., Fig. 1, while in Figs. 2 and 3 of this last Plate, the rising grounds of the longitudinal valley are represented with their characteristic forms due to the glacial action.

Señor Serrano Montaner now and then speaks in his publications, as in the paragraph quoted, of the eastern ridges of the Andes (*Cordones orientales de los Andes*); if this is so, where can the separation of the eastern and western ridges be located if not at the central ridge, i. e. the main chain of the Andes? Treaties say that the eastern side of the Andes is Argentine, and the western Chilian; and the Argentine boundary line having been proposed along the main chain, or "central ridge," Señor Serrano Montaner is virtually in agreement with the Argentine Expert, notwithstanding all that he has stated in attempting to prove that the continental divide and that of the Andes are identical, and that the boundary must be traced along what he erroneously calls the "eastern ridges of the Andes." Whenever Chilian authorities on this subject are examined, contradictions manifest themselves, which is only what might be expected when the argument is against the true facts of the case. Instead of supporting the claims of Chile, they, in reality, all serve to uphold the Argentine rights.

### 3. THE CHILIAN EXPLORING EXPEDITION OF THE PALENA.

Señor Serrano Montaner's explorations of the river Palena were followed by those of Dr. Steffen and Señor Fischer who, in 1894, went somewhat further in the survey of the river, though they did not succeed in reaching its sources.

Dr. Steffen has published, besides extracts in various geographical periodicals, two detailed reports of his journey. One of these reports, accompanied by two plans drawn by Señor Fischer, is found in the *Anales de la*



Universidad de Santiago de Chile;\* and the other in the *Verhandlungen des Deutschen Wissenschaftlichen Vereins zu Santiago de Chile*, † accompanied also by two maps.

This Chilean exploring expedition started from the Pacific coast on January 5, 1894, and crossing the rapids of the lower course of the Palena, which are unsurmountable obstacles for navigation, they arrived at the junction of the river Claro with the Palena, after a very hard journey owing to the unfavourable weather. In the Spanish account, ‡ Dr. Steffen says :—

P. 809.—“During our bivouacs on January 10, 11, 13 and 15, we experienced all the fury of the tempests that so frequently, even in the summer months, agitate the coast of Western Patagonia. Our meteorological journal contains for these days the record of sudden oscillations of the barometer, that in the space of twenty-four hours amount to over 10 millimetres, and as a result of this depression, cyclonic movements of extraordinary force were produced. All these storms arise in the north-west from the sea, and run furiously up to the Palena Valley, discharging copious showers, rarely accompanied by electric phenomena. The waters of the river increased rapidly. For instance, our second camp, established at about three metres above the river, on an island near the right bank, was in serious danger of being completely inundated and carried away by the current.”

At the river Claro, a southern affluent of the Palena, the exploring commission divided into two sections; Señor R. Roselot went to examine the river Claro, and Dr. Steffen the Palena and Carrenleufu. The latter arrived at the western longitudinal valley already referred to, through which the river descends between snowy mountains, from the north. The mountainous mass which is the “main chain of the Andes,” is thus described by Dr. Steffen in the same account :—

P. 813.—“This last-mentioned series of high mounts may be called the *intermediary ridge* in contradistinction to the ridges of the coast, and to another ridge situated much more to the east where the continental divide occurs; one must bear in mind, however, that, far from forming a continuous wall, as is generally the case, in the more northern regions, with the central ridges of the Cordillera, this intermediary ridge consists rather of a series of isolated *massifs* separated from each other by deep ravines and wide openings which can be traced very clearly in Plate 2 accompanying this article. In fact, a very marked dissimilarity from the other portions of the Chilean Cordillera is to be perceived in such an orographical configuration of the high southern Cordillera, as in this the difference between the average height of its summits and that of its chasms is very considerable. The deep ravines which open out between these *massifs* of the *intermediary ridge* are not more than a few hundred feet above the level of the sea, while their summits attain a height of about 2000 metres (6562 feet) at least.”

\* Vol. 87-89, Santiago, 1894.

† Vol. 3, Santiago, 1895.

‡ October 1894.

Before proceeding it is well to point out that the so-called *intermediary ridge* of Dr. Steffen's Spanish account is called "*central massif*" in his German Report, as can be seen in the map inserted herewith.

After arriving at the junction of the river Frío (which descends from the north, and is formed by the snows of the eastern and western chains in the intermediate valley), with the Carrenleufu, which comes down in a rushing torrent from the west, they, under great difficulties, followed this latter river. From the bottom of the valley where the exploring party stood, it was difficult for Dr. Steffen to form a correct idea of the orography of such a mountainous region. So he says:—

P. 824.—"We can do no less than recall here the difficulties which confront all travellers who, like ourselves, enter a deep valley between a series of high mountains, in ascertaining the fundamental orographical characteristics of the region traversed. Being always obliged to follow the windings of the river, we saw at a distance, from very different sides, the huge masses and groups of mounts which the river encircles, so that it was *sometimes almost impossible to accurately fix the position and trend of the ridges*, especially as the similarity in the external configuration of the mountains of this region is really extraordinary. Their serrated forms and the existence of many large and deep openings in almost every direction deceives one at times with regard to the trend of the gap through which the principal river runs. We found ourselves in such a position, for example, at a point situated between Camps 11 and 12, from which, not only two principal gorges, running north and east, but a series of secondary ones running north-west and north-east, and E.N.E., descended into the vast amphitheatre of our valley. Only with the construction of the route map and marking down the directions of the compass, registered at the principal mounts and gorges, did we succeed in forming a clearer idea of the orography of this valley. *The high snowy ridge which bounds the valley of the river Frío on the east is continued to the south of the Carrileufu river valley by the above-mentioned masses of Mount Serrano and two other very similar mountains. To these is joined, towards the west, a series of snow mountains, of which the one, called by us Mount Maldonado, is visible from our 6th Camp, a very little above the mouth of the river Claro.* In its external appearance this mountain is also a smaller copy of Mount Serrano. It is, however, a well authenticated fact that the river Palena-Carrileufu *completely traverses in quite a spacious valley the series of massifs forming, as a whole, the intermediary ridge of the Cordillera.* This interesting geographical phenomenon cannot be better illustrated than by the record of heights which, in a gradual ascent of the river, we made by means of the hypsometer and aneroids. According to these data, in that tract of the valley situated between Camps 11 and 12—that is to say, at that point where we had the above-described mountains at our backs—an elevation of 100 metres (328 feet) above the level of the sea was reached."

P. 829.—"The gorge of the river Carrileufu which we followed, seemed to be a deep incision cut out in an irregular plateau of medium height by erosion which undoubtedly must have worked in a retrograde direction, that is to say, beginning from the west of the region of greater atmospheric humidity. The rock substance—i.e. biotitic granites which



D. HANS STEFFEN, 1895.

(From Das Thal des Rio Palena-Carrileufu.)



are the same in both banks of the river—is found in an advanced state of decomposition, so that in certain places where the granite was almost completely transformed into a kind of clay, it was impossible to take out a specimen of the living rock which was indispensable to a petrographical investigation. The sides of these defiles rise generally to from sixty to eighty metres (197 to 262 feet) above the level of the river; they are perpendicular and indicate the occurrence of great landslips, masses of detritus and fragments of rock having accumulated on the banks. The small tributary streams of the Carrileufu *rush down from the heights as cascades, or rather currents* of water, of a very picturesque appearance. In short, from the second Angostura (pass), *for a distance of not less than eight kilometres (4·97 statute miles), the valley is a typical defile*, the most perfect and magnificent examples of which are the canyons of Mexico, Texas and the Rocky Mountains of North America. Vegetation does not find much foothold in these precipitous gorges.”

P. 831.—“At all events, the destruction of the forest by these fires occasions the great diminution in the atmospheric humidity of these regions, protected as they are by the *high mountains* which we left behind us. The violent storms which we observed on the coast of the Gulf of Corcovado, and which pursued us during the first days of our journey, discharge their enormous floods of rain at the western bases of those mountains; but even in the region of the Upper Carrileufu we nevertheless had opportunity to observe some heavy rain-storms with violent gusts from the north-west, evidently the fag-ends of furious storms raging on the Pacific coast, *which found their way into the Cordillera through the deep clefts and crevices which intersect it.*”

P. 148.\*—“In the afternoon we came to a place very difficult of passage, which we named *El Risco* (the Steep Rock), where the bank of the river was obstructed by a perpendicular wall of rock of some seven metres in height descending sheer into the water and preventing passage by the shore. We had to use a rope to scale the rock and to hoist the luggage to the top piece by piece in the midst of the rain which hardly ceased for a moment,—a very long operation and not without some danger. Crossing over *El Risco* and fording a torrent, we fixed our camp (No. 20) on a narrow rocky shore at the foot of the high hills which shut in the valley.”

P. 149.—“Having convinced myself by information from my companions that the road on the left bank of the river had no great obstructions, and as we knew from reports given by Señor Delfin and the English miners that on the north bank continual difficulties in the ground were to be met with, it being impossible, moreover, to avoid having to ford a large affluent of the Carrileufu, the Chaviñique-Pallá, I resolved to pursue the march on the other side, crossing the river at the same point where Señor Serrano crossed it in 1887. As we were now near this point, I ordered the guide to push forward at daybreak on the 8th, with several men to construct a wooden bridge, and I continued in the meantime to advance with the caravan to the said crossing point. *We scaled a somewhat steep hill (the fourth large hill) of about 60 metres in height, and then descended to a narrow shore, from which the aspect of the defile or canyon was really typical; through it the river had opened a passage for itself, its waters being confined between precipices which rise ruggedly to at least 200 metres above the level of the river.* The current is very rapid with violent sinuosities, the general direction being from east to west (Serrano Pass).”

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\* November 1894.



In the extract of the Report published by the German Scientific Society at Santiago, Dr. Steffen thus describes the march along the Carrenleufu :—

P. 47.—“Following the course of our expedition we leave the river Frio on the left and continue our journey through the Carrileufu valley, which, like the lower Palena valley, broadens at intervals to three or four kilometres and is surrounded in the distance by moderately high wooded mountains with steep rocky precipices, *which are offshoots of the central Cordillera massif now lying behind us.* The Carrileufu flows through beautifully wooded country in large serpentines, bordered for kilometres by high vast plains, with somewhat more open vegetation than on the west coast; also broad forest meadows and swampy lowlands, *ñadis*, with many dead trees are visible in the lower part of the valley. A look towards the west shows us the magnificent central massif of the Monte Serrano, separated by a deep breach towards the south from two snow-clad and glacial mountain colossi of astonishing similarity of shape. Also in a north-west direction, *the snow massifs of the northern continuation of the central ridge become visible, amongst them a mountain rising probably to a height of 2000 metres, of a blunted form, and with a large ice-field and glacier (Mount Blanco), which appears to be modelled out of the general mountain system;* from the north-west an outlet of the glacier sends its waters down to the Carrileufu.

“We passed this section of the valley with comparative light trouble in two long days of travel (January 28 and 29). The distance to the beginning of a ravine-like narrowing of the valley which may suitably be called the Segunda Angostura, amounts to about forty kilometres, counting all the bends of the river. The peculiar formation of the Carrileufu valley here is caused by the approaching of steep, rocky precipices on either side of the river. *The whole valley attains a width of only about twenty metres in some parts;* at the bottom of the ravine the river flows steeply downwards and makes very sharp curves, causing rapids at every corner, the passage of which is connected with great difficulties and danger. Thus it is easily comprehensible that we only advanced twenty-two kilometres in the course of the river, in the last three days of travel by boat (January 30 to February 1), after incessant toilsome work.”

The difficulties which confronted Señores Serrano Montaner and Steffen during their exploration of the river Palena, suffice to indicate the little value of that river as a means of communication between the two sides of the Cordillera; their statements on this point have been confirmed by the Argentine Boundary Party who surveyed that region in the summer of 1898. Landslips are frequent, and it would entail enormous expense to construct and maintain a cart-road which could only be utilised under the most favourable climatic conditions during *two or three months in the year.* Nature herself is opposed to such a frontier in that region as that proposed by the Chilian Expert: whilst on the other hand no better boundary can there be than that which follows the high snowy summits of the main chain and crosses the defiles and river rapids, as proposed by the Argentine Expert. These rivers, rapids and

defiles are situated, as is ascertained by the same explorers, to the west of the upper valley of the Carrileufu, and they form, on account of their abruptness, a good frontier in the small stretches between high mountains where the waterways are crossed by the Argentine line.

The Chilian exploring expedition of the Palena consisted of two parties, one coming by the river from the Pacific side, and the other from the north, through Argentine territory. Dr. Steffen, who was with the first party, having received notice that the second party was in the neighbourhood, sent his assistant Señor Fischer in advance to meet it. This traveller continued to the east through a region becoming more and more open. Along the upper valley of the narrow river, which here chiefly consists of a series of long rapids, he found on its shores heaps of cattle bones and fresh tracks of cattle, which were unmistakable signs of the presence of wild beasts that never cross the Cordillera to the west. Dr. Steffen,\* describing this expedition, says :—

P. 152.—“The travellers were at that time at the entrance of the famous ‘Valle Superior’ of the Carrileufu, and in the bend where the river changes its east and west direction for that of south and north, and where its breadth is from 10 to 15 kilometres (6·21 to 9·32 miles). This breadth is reduced farther on between the two lateral ridges which appear to converge towards the source of the river, probably fifty kilometres to the south. The valley is covered with high grass, interspersed with bushes, which appear like green patches over yellow background. *The imposing dividing ridge* which rises to the east of the valley is composed of slopes, generally very abrupt, and is cut by a deep gorge covered with cypresses, from which point flows a larger tributary stream, the *river de las Casas*, which joins the Carrileufu near the bend of the great curve described by this river when taking a westerly course. At the north shore of the river *de las Casas* is situated the little house which has been mentioned so frequently, built of logs of pine alternately placed. In a corner near the house, potatoes, wheat, cabbages and other vegetables were found.”

A careful examination of the valley led Señor Fischer to the conclusion that it is identical with that described by Captain Chaworth Musters, in which he travelled with the Tehuelche Indians to hunt wild cattle.

The second party of the exploring expedition also reached this valley, to which the following reference is made :—

P. 160.—“In front of the travellers now lay the Frio Valley, which forms a square, the sides of which measure from eight to ten kilometres, irrigated by the Chaviñique-

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\* *Anales de la Universidad de Chile*, November 1894.

Pallá river, which follows a winding course and has a general direction from north-east to south-west. *It is bounded on the west by an imposing snowy ridge intersected in various places by deep gullies from which descend magnificent glaciers which feed the tributaries of the river.* Towards the north, the tableland disappears in low hills, and to the east the view is limited by the dividing ridge of imposing height though with only small patches of snow."

It has been already said that this "dividing ridge" is only the southern portion of the chain of Lelej and Esguel, and that it does not belong to the Cordillera de los Andes. The two Chilean parties are right when stating that to the west of the longitudinal valley of 16 de Octubre and Carrenleufu, there exists an imposing chain of snowy mountains, but both are mistaken when affirming that the "dividing ridge" to the east is of imposing height. In fact, to the south of Mount Cucho there does not exist any important hill, and the surveyors of the Chilean Boundary Commission who have lately visited the ground will have discovered by this time the error, and will have observed that there the Patagonian orography does not present any considerable altitude, and that the "dividing ridge," figured in the three maps of Señores Steffen and Fischer which have been reproduced (pp. 542 and following), does not exist at all to the east of the Carrenleufu river, since the continental water-parting occurs in a generally flat country, and often through swamps. The eastern spurs of the imposing Cordillera rise only to the west of the river.

Dr. Steffen refers to Captain Musters' journey and to the Argentine expedition under Señores Bell and Burneister, in 1886, to that valley. Neither the one nor the other say in their reports that there is to the east of the Carrenleufu a ridge of the Cordillera. Captain Musters, in his sketch showing his route to the valley—which is very incomplete owing to the condition in which he travelled—represents the Cordillera as a continuous range as he saw it, though he did not locate it correctly, because he only arrived at the point where the river Frío flows into the Carrenleufu. In his journal nothing indicates that to reach that place he crossed the main chain of the Andes.

#### 4. THE PROPOSED ARGENTINE AND CHILIAN LINES IN THIS ZONE.

None of the Chilean explorers above mentioned have visited the southern course of the Carrenleufu, nor had the surveyors of the Chilean Boundary Commission made careful investigations of the upper course of that river until

the year 1898 ; so that the part of the map presented to Her Britannic Majesty's Government by the Chilian Representative showing this region contains very few more details than the one published in 1896 by the present Argentine Expert.

The Chilian explorers have verified in 1894 the existence of Argentine settlements in the upper valley of the Carrenleufu, and these have been so successful that in many of the secondary valleys, prosperous farms now exist connected by easy wagon-roads with Tecka and Genua, and with the 16 de Octubre Colony. The persistent error of the Chilian Expert in considering the water-parting line as the main chain of the Andes, leads him to ignore the nationality of those settlements, and just as he tries to include within Chilian territory the 16 de Octubre Colony, he endeavours to extend Chilian jurisdiction over the valley of the Carrenleufu. With this purpose, the region where the boundary line must be traced, i.e. the summit of the main chain, is thus described :—

“The two points denominated *Nameless opening*, marked with numbers 299 and 300, separate the hydrographic basin of the Chilian river Palena from that of the Argentine river Chubut.”

These words are the best confirmation of the Argentine assertions that there does not exist any important altitude east of the Carrenleufu (north-western branch of the Palena), separating its waters from those of the river Tecka which flows into the Chubut river. Although the Chilian Expert is always prone to make the most of any elevation existing near the continental water-parting, he has been unable to find any high mountain in that section of his line, and for that reason the traditional snowy range is replaced in his proposal by two *nameless openings*.

Between the hollow in the valley where the Colony of 16 de Octubre is situated, and the Carrenleufu prolongation of the valley, there are only sedimentary tertiary layers, covered with glacial accumulations.

The Carrenleufu river cuts right through the Cordillera de los Andes as has been ascertained by the Chilian and Argentine investigations, and as it is uniformly acknowledged by Señores Bertrand, Serrano Montaner and Steffen. It is therefore, thoroughly proved that the Cordillera lies to the west of a *part of the river*.

To the south of the eastern great bend of the river Fetaleufu, the eastern depression is dominated by elevated peaks, the heights of which attain 2200



metres (7218 feet) above the level of the sea. The principal streams which feed the river Frio—which there flows in this depression at the eastern foot of the Cordillera—proceed from these snow-capped mountains which extend to the west and unite with the main chain, that thus separates the waters flowing east and west to the Carrenleufu from the north of this river. Smaller streams also come from the east, having some of their sources near Lake Rosario. In the undulated valley there are small lakes and lagoons, some of which lie between the glacial hillocks, and are without visible outlet, such as Lagoon Fearball, near which the photograph reproduced in Plate LXXVI. was taken. To the right of



MOUNT SERRANO, FROM THE RIVER CARRENLEUFU TO THE S.W.

this photograph the southern slope of Mount Situación is seen, then the opening of the Fetaleufu, the snowy ridge already mentioned as running southwards, the ridge of Tobas, between which and the former the river Hielo flows, farther west the main chain of the Cordillera bounding the wide western branch of the valley, and to the south the heights of Mount Herrero, 1860 metres (6102 feet), in the lateral ridge of the Cordillera to the west of the Carrenleufu.

This lateral ridge of the Cordillera appears to be separated from the main chain by a general depression through which, from the south, the river del Salto flows to the Carrenleufu.

The Argentine proposed line, in following along the main chain, cuts the river Carrenleufu at its gap, according to the rules already explained. The line then is prolonged southwards along Mounts Serrano (No. 292), Morro (No. 293), Maldonado (No. 294) and Puntigudo (No. 295), well-known heights of the main chain, and snow-capped peaks of at least 2000 metres (6562 feet). The main chain in this district commands to the west the longitudinal depression occupied by the river Palena, its northern affluent the river Frío or Yanteles, and its southern affluent the river Claro, and is formed by a compact mass of snowy peaks, bounded to the east by the valley of the river del Salto, and farther south



RIVER CARENLEUFU, FLOWING FROM LAKE PAZ.

by the western part of Lake General Paz, called in the Chilian map, on a scale of 1 m. : 1,000,000, Lake Palena, which name is, however, completely unknown by cartographers, and by the inhabitants of the country. This lake, which is about twenty-five miles long from west to east, is fed by the waters of the main chain, and receives those of some of the other small lakes existing in narrow hollows of the chain which, in the vicinity of the lake, follows a N.N.E. and S.S.W. direction, attains an altitude of 2200 metres (7218 feet) and contains numerous glaciers (Plate LXXVII.). To the north of the lake (Plate LXXVIII.) there are groups of mountains cut by deep ravines, where other small lakes exist, the outlets

ARGENTINE-CHILIAN BOUNDARY QUESTION.

PLATE LXXVI.

*Mount Herrera*  
(1860 m.; 6102 ft.).

*Mountains to the South of  
the Carren-Leufu.*

*Ridge of Tobas.*

*Lake Florbali.*

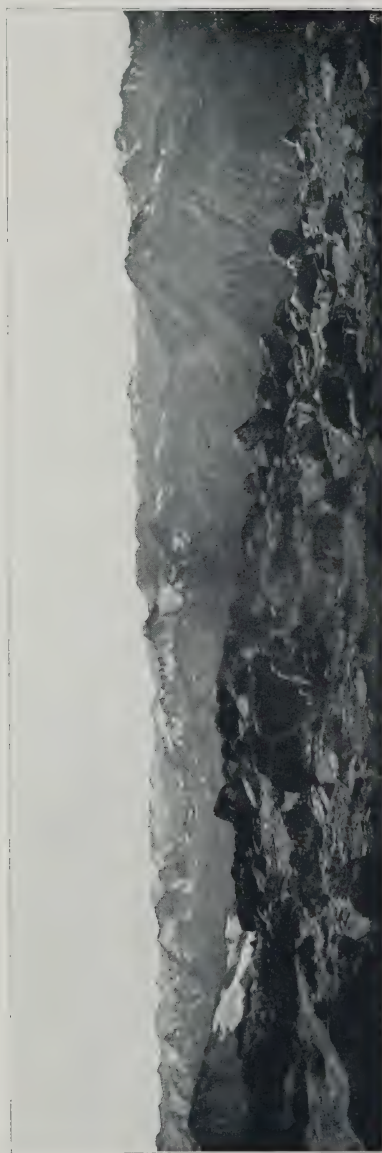


SOUTH OF VALLEY 16 DE OCTUBRE AND ITS SOUTHERN PROLONGATION IN THE VALLEY OF THE CARREN-LEUFU.

*Face p. 607.*







CORDILLERA DE LOS ANDES TO THE WEST OF LAKE PAZ.





LAKE PAZ AND THE EASTERN RIDGES OF THE CORDILLERA DE LOS ANDES TO THE NORTH OF THE LAKE.

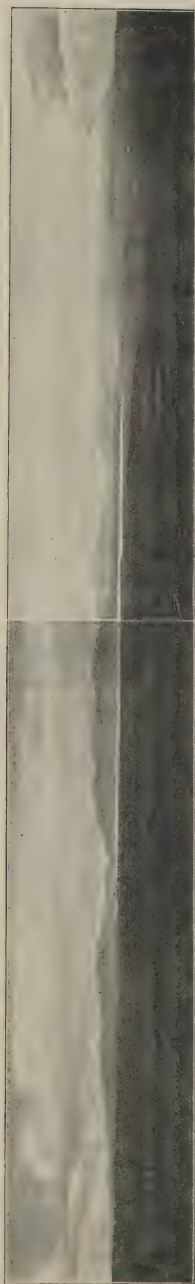




of which flow to the river Carrenleufu, not far distant, and where this river takes its rise in the wide eastern bay of Lake Paz. The eastern part of those groups of mountains is represented in Plate LXXIX.

The altitude of the lake is 860 metres (2822 feet) above the sea, and it is at present bounded on the east by a glacial dam, in which appear sedimentary layers showing the larger extension of the old lake. Just as Lake Quechulafquen, Lake Paz is the remnant of a large lost lake, the principal outlet of which flowed to the Atlantic, probably through the present terraced valleys, where the river Tecka winds its way. Figs. 1 and 2 of Plate LXXX., as well as the one inserted herewith, represent Lake Paz from the east, the photographs having been taken from different points to show that while to the south-west and north-west of it rise the spurs of the Cordillera, to the east, north-east and south-east there are only denuded pre-glacial plains, furrowed to-day by the dry beds of lost rivers and glacial material. The outlet of the lake is the river Carrenleufu, as represented in the figure inserted herewith. The photograph in Plate LXXXI. requires no further explanation concerning the character of the level plain across which the river meanders, and justifies once more the Argentine assertion that the lake is situated on the eastern slope of the Andes, and that its normal outlet was towards the Atlantic before the gorges, by which this, and many other streams have run to the Pacific Ocean, were cut through the Cordillera.

This plain is the continuation to the south of the longitudinal depression at the eastern foot of the Andes, which has been so frequently referred to, and the extension of which, eroded by the Carrenleufu and its affluents, has received from the Colonists the name of the Valley of Carrenleufu. The river at its commencement flows to the E.N.E., then turns to the north, bending afterwards to the north-west and west, in which direction it cuts the Cordillera. Plate LXXXII. shows the valley and the river at the point where, flowing from the south-east, it changes to the west. At this point many Colonists have settled to the north and south of the Huemules stream, its principal affluent, which rises at the southern slope of Mount Cuche. This plate is the continuation to the north of the landscape shown on Plate LXXXI. To the north-west is seen the ridge of Tobas, to the north of the river Carrenleufu. The snowy mountains represented in the centre are the eastern ridge of the Cordillera, with Mounts Herrero and Central in which slopes are seen the old terraces formed at the time when all the water flowing from the eastern slopes of the Andes ran to the east, and contain material of so recent an origin, that there can be no doubt that the gorge

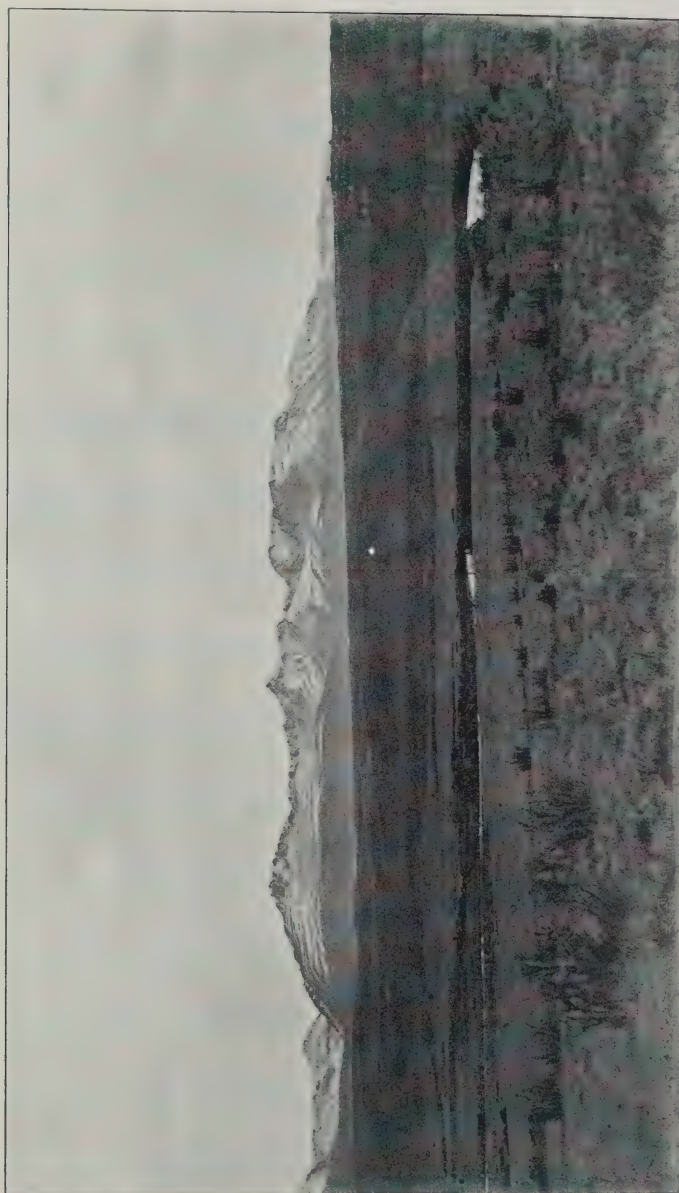


LAKE PAZ, THE EASTERN FLUVIO-GLACIAL PLAIN, AND THE FIRST SPURS OF THE CORDILLERA.

of the main chain, through which the river now flows and by which the large lake empties itself, is of comparatively very recent date. The sedimentary deposits there to be found are posterior to the glacial epoch, the remnants of which form the morainic accumulation observed in the foreground. These lacustrine terraces sloping in a general direction opposite to that in which the river now flows, and to the erosion of which they are principally due, are to be found in all the beds of former lakes at the foot of the Andes.

This valley, notwithstanding its geographical conditions, is considered by the Chilean Expert to be situated, not at the eastern foot, *but at the western foot of the main chain of the Cordillera*, and in consequence he has traced his proposed line to the east of the valley, leaving in Chile the region to the west of the two points denominated by him, "Nameless Opening." The line so vaguely described has again been traced altogether outside the Cordillera, against the letter and spirit of the boundary Treaties. South of Mount Cuche the lateral ridge of the Pre-Cordillera loses its continuity, and is broken up into hills of comparatively low altitude, with wide openings between them; farther south it is completely lost in the Patagonian high plains.

The Chilean Expert refers in his definition to the basin of the river Chabut in that part watered by the Tecka river. This river has cut its channel through sedimentary rocks of lacustrine origin, the horizontal strata of which are found in their normal position covered with glacial material. It is evident that at no very distant period a large river passed through this valley to the east, since a small stream, such as the one which flows at the present time, would never have succeeded in cutting out so wide a valley. If the valley of the Tecka is followed, it will be found to terminate



RIVER CARRÉN-LEUFU. EASTERN RIDGE OF THE CORDILLERA TO THE NORTH-WEST OF THE OUTLET OF LAKE GENERAL PAZ



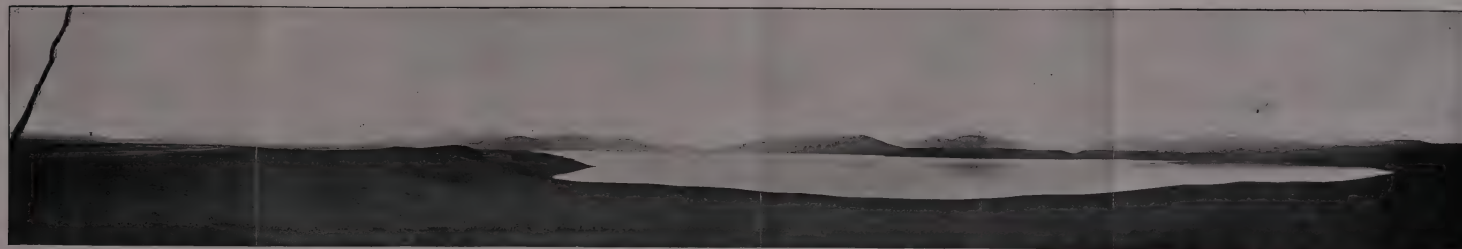


FIG. 1.



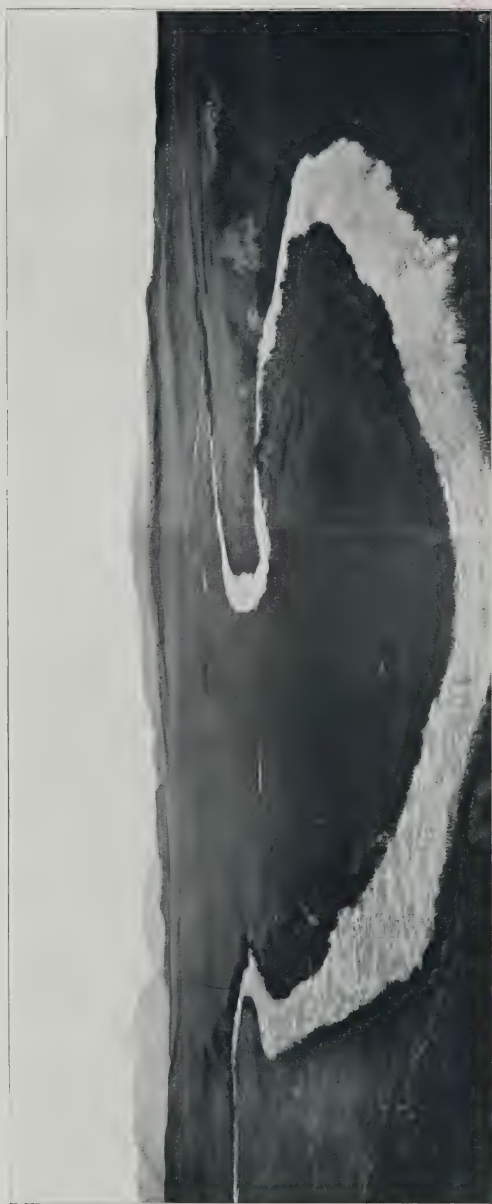
LAKE GENERAL PAZ AND THE FIRST SPURS OF THE CORDILLERA FROM THE EAST.

FIG. 2.



LAKE GENERAL PAZ AND THE FIRST SPURS OF THE CORDILLERA FROM THE EAST.





RIVER CARRÉN-LEUFU, BEFORE ENTERING THE EASTERN RIDGES OF THE CORDILLERA.





*Mount Central.*

*Mount Horro*  
(1860 m.; 6102 f.).

*Tobos Ridge.*



VALLEY OF THE CARREN-LEUFU, WHERE THE RIVER CHANGES ITS COURSE TOWARDS THE WEST, BEFORE ENTERING THE CORDILLERA.



in an extensive plain 1800 metres (5906 feet) above the sea to the south-west of Mount Cuche, which plain was formerly the bed of a post-glacial lake, and communicates with another one to the north-west, the two being united by terraces of the same origin, 200 metres (656 feet) high, which show the ancient level of the lake. Passing to the west by a succession of small lacustrine basins between basaltic porphyric rocks where the river Huemules flows, the Valley of Carrenleufu is reached. The terraces continue with the same level, and all slightly incline to the east, notwithstanding the present western course of the



RIVER CARRENLEUFU BEFORE ENTERING THE CORDILLERA  
AND THE RIDGE OF MOUNT CUCHE.

Huemules, thus indicating the former direction of the outlet of the lake, the waters of which flowed to the river Teeka. The region to the east now watered by the last named river, is called Pampa Grande, and is represented in Plate LXXXIII. This complete panorama shows the southern end of the ridge of Cuche, and the undulating plain and terraces to the south, proving that the character of the country is entirely different to that depicted on the maps published by the Chilian Boundary Commission. If to the north of Mount Cuche, some mountains do exist where the Chilian Expert has traced his proposed boundary line, to the south of Mount Cuche there will not be found for

a long distance, a single important hill, the line running across undulating ground, deep valleys and marshes.

The flatness of the region where the Chilian Expert has located the main chain of the Andes is demonstrated by the Tecka Valley. To the east of the confluence of the streams which form the river it has a height of 710 metres (2329 feet) above the sea-level, and the "continental divide" 25 kilometres (15 miles) to the west, only attains an altitude of 760 metres (2493 feet), that is to say, a gradient of less than 2 per cent., whilst the gradient to the west of the Valley of Carrenleufu by the river Huemules, where there are several farms, is almost 4 per cent.

To the south of Pampa Grande winds the southern affluent of the Tecka, rising in the neighbourhood of the Carrenleufu Valley, in an undulating land in which the Chilian landmark, No. 300 is evidently located. Near it, to the south, are situated the Catango rising grounds, 1045 metres (3428 feet) above the sea-level. Plate LXXXIV., Fig. 1, a photograph taken from the bend of the Carrenleufu to the east, shows the Catango Hills extending northwest-southeast, as well as the lagoon the outlet of which flows to the Atlantic by the stream Ñirehuao, and the river Genua, the continental divide occurring in the swamp to the north-west of the lagoon at a height of 816 metres (2677 feet) above the sea. There, heights of 800, 880, 885, 895 and 960 metres (2625, 2887, 2904, 2936 and 3150 feet) above the sea, form the so-called main chain of the Andes of the Chilian Expert, and from these hills the water flows to the Pacific and to the Atlantic across a country so level that the gradient from the sources of the Ñirehuao stream, to its confluence with the river Genua—distant 36 miles to the east, and situated at an altitude of 746 metres (2448 feet)—does not reach 4 per cent.

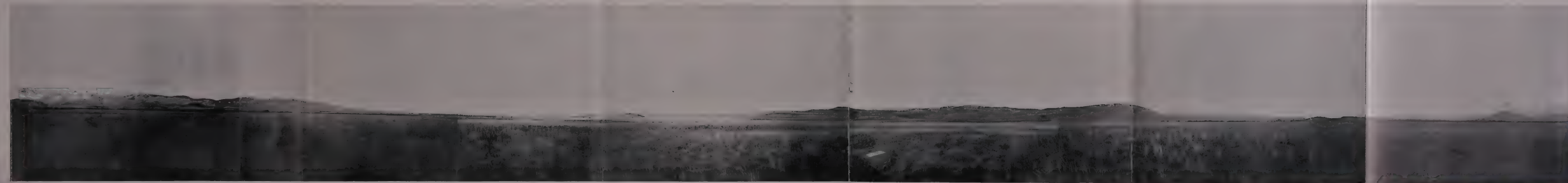
Fig. 2 of the same Plate is a panorama taken a little further south. The river Carrenleufu is seen to the west together with the eastern foothills of the Cordillera; while to the north-west—where the continental divide occurs, at an altitude of 880 metres (2887 feet)—only low hills exist. In the two figs. of Plate LXXXV., the same panorama is continued; the low Diablo Hills, with heights of 1325, 1050, 1160, 1140, 1270 metres (4347, 3445, 3806, 3740, 4167 feet), mark there the continental divide, the line of hillocks being cut everywhere by the waters rising in the tableland, the western edge of which is at an altitude of 1000 metres (3281 feet). There are the sources of rivulets flowing into the river Genua as well as of the rivulets which flow into the Carrenleufu and also of streams running to the river Pico, the south-eastern arm of the Palena river. La Piedra rising



ARGENTINE-CHILIAN BOUNDARY QUESTION.

Mount Cerro  
(1705 m.; 5594 f.).

PLATE LXXXIII.



N.

E.

S.

W.

PANORAMIC VIEW OF PAMPA GRANDE (760 m.; 2493 f.).

[Face p. 841.]



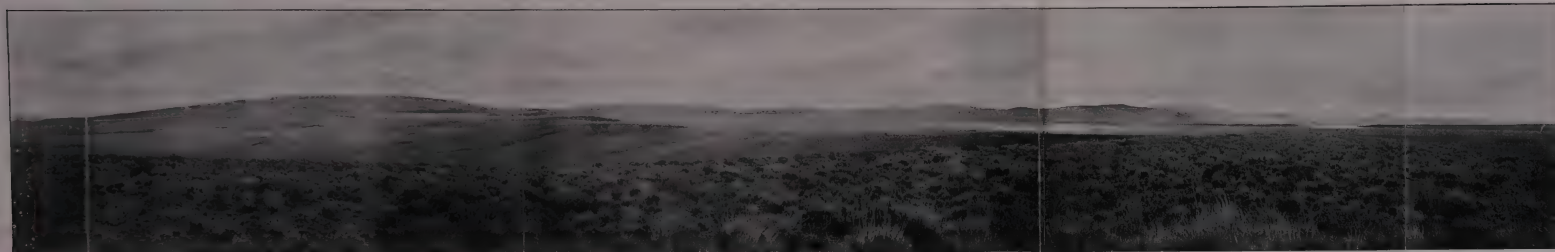
*Waters flowing to the Carren-Leufu (West).*

*Catango Rising Ground*  
(1045 m.; 3428 f.).

*Continental Divide.*

*Lagoon flowing to the Nirchuno (East).*

FIG. 1.

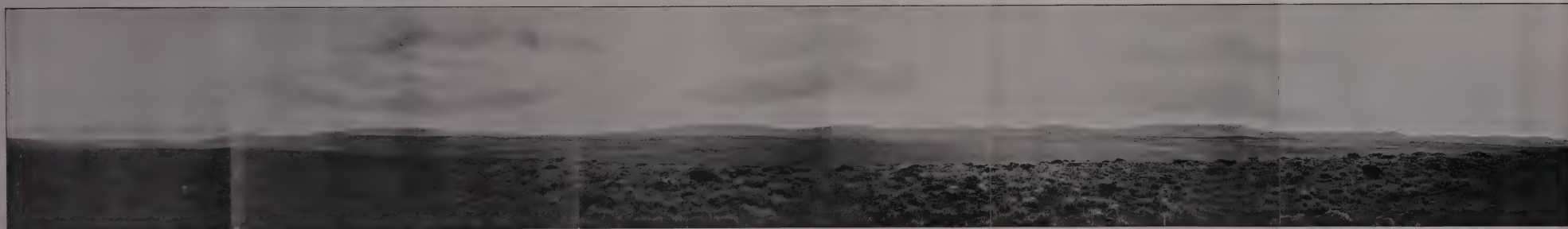


CATANGO HILLS FROM THE EASTERN BEND OF THE RIVER CARREN-LEUFU.

*River Carren-Leufu.*

*Continental Divide*  
(880 m.; 2887 f.).

FIG. 2.



W.

N.W.

N.E.

E.

THE PLAIN TO THE EAST OF THE RIVER CARREN-LEUFU, SHOWING THAT RIVER AND THE CATANGO HILLS.

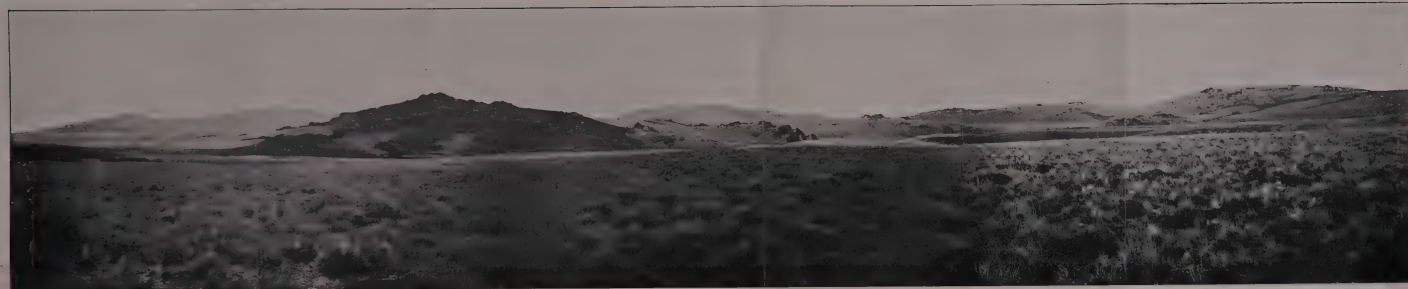
[Place p. 842.]





*Diablo Hill* (1270 m.; 4167 f.).

FIG. 1.



N.E.

E.

S.E.

FIG. 2.



N.E.

E.

S.E.

THE CONTINENTAL DIVIDE AT, AND TO THE WEST OF, THE DIABLO HILL.



ground, situated in that plain, is represented in Plate LXXXVI. In several points of this zone Argentine settlements are to be found, such as Vargas and Curamillo. This region when seen from the plains watered by the lower course of the Ñirchua to the east, presents the same slightly undulating aspect. Plate LXXXVII., represents the ridge of hills of Putrachoique, with the Diablo Hills to the west, and to the east the low hills of Tepuel, named "Cordillera de Tepuel" in the Chilean maps.

The Chilean Representative as well as the Chilean Expert have said that the water-parting line is one of the topographical features easiest to perceive and mark out. The Argentine Republic, while accepting that a water-parting line—continental divide or a simple divide—in a mountain chain, such as the main chain of the Andes, is oftentimes easy to distinguish, thinks nevertheless, that when the line runs over hills, hillocks, plains, low meadows and marshes, it often becomes almost impossible to determine the exact line of the water-parting, and this is the case in the region where the Chilean Expert has proposed his landmarks 299 and 300.

There, nothing is more difficult to distinguish and nothing more inadequate as a boundary than the so-called "continental divide," even if this divide were ordered as a frontier, instead of the summit of the Cordillera de los Andes, as is the undeniable case.

The abnormal water-parting in this extension commences with the sources of the river Huemules,—a tributary of the Carrenleufu,—at 1705 metres (5594 feet) above the sea, on the south-west slope of Mount Cuche. Immediately to the south of this height is a valley which the river Huemules crosses at a height of 760 metres (2493 feet), and there originates a rivulet tributary of the river Tecka. To the south the divide ascends another high hill, 1715 metres (5626 feet) above the sea, to descend another transversal flat valley at a height of 750 metres (2461 feet), and continuing by an altitude from 910 metres (2986 feet), to 765 metres (2182 feet) above the sea, runs across swamps the waters of which run sometimes to the river Carrenleufu and sometimes to the river Tecka. Catango rising ground, 1045 metres (3428 feet) above the sea, is the next culminating point of the divide.

At the south-eastern foot of this hill there exists a series of little fluvio-glacial terraces enclosing the waters, which have no apparent outlet, it being subterranean. These glacial accumulations are generally about one hundred feet high above the bottom of the little lagoons and swamps, and a great part of the waters running in the inflections of these accumulations lose themselves under-

ground before reaching the swampy lagoons. The highest of these undulations is 1035 metres (3395 feet), and the lowest, 850 metres (2789 feet). Continuing to the south and west, the water-parting extends in the morainic ground west of Diablo Hills at a mean altitude of 970 metres (3182 feet). The waters sometimes flow to the Carrenleufu, sometimes to the Ñirehuao stream, tributary of the river Genua. The "divide" wanders there in plains of a level where the eye does not distinguish appreciable differences, ascends then a lateral moraine to a height of 1165 metres (3822 feet), the greatest altitude reached in that region, and descends again to 1050 metres (3445 feet), to the west of La Piedra rising ground, 1150 metres (3773 feet) above the sea.

In the hillocks the waters running south go to the south-eastern branch of the Palena, the river Pico, which will be briefly described in the next chapter.

From the north of the Huemules to La Piedra rising ground, there are not, as has also been lately observed by the Chilean explorers, any orographical features that can be considered as a mountain ridge, and all the advantages that the Chilean Representative attributes to the water-parting are completely faulty. There is a great difference therefore, between this divide—located in Nos. 299 and 300 of the Chilean line—and the watershed of the main chain of the Andes, located in Nos. 292 to 295 of the Argentine line, as the plates where the two are represented make manifest. This last watershed unites all the conditions required by international law for a good natural boundary, is the one stipulated in the Treaties, and combines the hydrographical with the orographical features of the Cordillera.

When the Representatives of Chile accredited before Foreign Governments have occasion to describe the boundaries of their own country, they always refer to the gigantic features of the Andes, since they know that passing arbitrary interpretations are unable to destroy the traditional limit. Señor Infante, Chargé d'Affaires of Chile in the United States,\* has recently said :—

"It would have been my desire to give to the International Commercial Congress a clear idea of the importance of the *long and narrow strip of territory which extends between the range of the Andes and the Pacific Ocean*, and the part it plays in the commerce of nations. . . . Chile, *narrow and small as it appears in the geographical charts*, has an area of 750,000 square kilometres, *or an extension much larger than any of the European countries, with the exception of Russia.*"

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\* Address delivered at the International Commercial Congress, held at Philadelphia, on October 28, 1899. Monthly Bulletin of the Bureau of American Republics, November 1899, page 610.





LA PIEDRA, RISING GROUND (1160 m.; 3775 f.).

[Place p. 843.]



*Nirehuao Stream.*

*Tepuel Hills.*



THE PUTRACHOIQUE AND THE TEPUEL HILLS, FROM THE PLAIN TO THE SOUTH OF NIREHUAO STREAM.

[Face p. 843.]





This orographical conception of the boundary which pervades through all the writings of Chilean statesmen, is also shared as it has been said, by Señor Barros Arana himself, who, even when upholding his fresh theories, maintains that his continental divide occurs in the main chain of the Andes. Nevertheless, if the Chilean landmarks Nos. 299 and 300 were accepted, surprising results would ensue. As there the continental water-parting wanders in plains of such a level that the eye does not distinguish appreciable differences, the range of the Andes of Señor Infante, and the main chain of the Andes of Señor Barros Arana, would be constituted by those plains, and by *swamps*, the waters of which sometimes run to the Pacific and sometimes to the Atlantic. A doctrine which leads to such consequences is untenable. A line which is based on such a doctrine must inevitably be rejected.

When in 1896 the Chilean assistants proposed to the Argentine surveyors to locate landmarks in the continental divide here mentioned, the latter declined, and the Argentine Expert declared to his colleague that his assistants would take no notice of any such proposition as their mission was to survey within the Cordillera de los Andes, and not outside it. The Chilean Expert did not press the matter, as he was unable to show that the Patagonian plain is within the Cordillera. These plains and hills have been always considered as Argentine, considerable tracts of public land have been sold there, mining prospectors have obtained grants for gold-washing works, and official maps have been published indicating the lands settled, without Chile ever asking for explanations until 1898, when on the eve of Arbitration it was observed that this prolonged silence destroyed the pretensions to the continental divide as a boundary, pretensions which can be explained only through ignorance of the geography of the boundary region. The distance between the "summit of the Andes," the "main chain," the "central," the "intermediary chain," considered as synonymous by the Chilean explorers, and the main chain of the Andes, as considered by the Chilean Expert, i.e. the distance between Nos. 292 to 295 of the Argentine line and Nos. 299 and 300 of the Chilean line, is about fifty-five miles, and in the region between these two lines no Chilean settlement has ever existed. From 1893 to 1898, sales of land have been made by the Argentine Republic; people have always known that the Andes do not exist there at all, but good pasture level lands, extensive downs and meadows, watered by the rivers descending from the eastern slope of the Cordillera, and that the whole region is Argentine, according to the Treaties of 1881 and 1893.

## CHAPTER XXIV.

- Summary*—1. DIFFERENCES IN THE REGION OF THE RIVERS PICO AND FRÍAS.  
2. EXPLORATIONS CARRIED OUT IN THIS ZONE.  
3. GENERAL CONFIGURATION OF THE GROUND.

**1. DIFFERENCES IN THE REGION OF THE RIVERS PICO AND FRÍAS.**

THE Chilean proposed line, after passing far east of the Cordillera by the points marked with Nos. 299 and 300 at two "*nameless openings*," is thus described in its continuation towards the south:—

"The points denominated: Nameless Portezuelo (pass) with No. 301, Nameless accessible mountain 302, Accessible nameless mountain 303, Nameless accessible mountain 304, Nameless point 305 and Nameless accessible mountain 306, separate the hydrographical basin of the Chilean river Palena from that of the Argentine river Senguerr. The point denominated: Nameless hillock (loma), Nameless low point and Nameless Cordillera, marked with numbers 307 to 310, separate the hydrographical basin of the Chilean river Cisnes from that of the Argentine river Senguerr."

A simple perusal of this part of the Record of August 29, 1898, suffices to show that, according to the true meaning of the Treaties in force, the boundary line cannot be traced along those *nameless* points proposed by the Chilean Expert. In this region the features of the ground as regards orography are, generally speaking, less accentuated than in the zone watered by the eastern tributaries of the river Carrenleufu and the affluents of the river Tecka.

It has already been thoroughly proved that the South-America water-parting does not always occur within the Cordillera de los Andes, along the summit of which the international limit must be marked out. The section where the Chilean landmarks Nos. 301 to 310 are proposed to be planted affords further evidence of this fact, and make apparent the manifest contradiction fallen into by those who upholding that the line must run along the highest summit of the Cordillera de los Andes that may divide the waters, maintain at the same time that this line must follow the continental divide.

Señor Serrano Montaner,\* one of the most active advocates of the theory of the *divortium aquarum*, says:—

P. 58.—“ . . . What Chile maintains and has always maintained are the two following principles:—

“1. The limit between the two countries is the Cordillera de los Andes.

“2. The boundary line is the one which separates the waters to one side and to the other, i.e. the *divortia aquarum* of the Andes.”

P. 59.—“ In Chile the opinion prevails that this boundary line, the *divortia aquarum* of the Andes, is not in any point outside the Cordillera, and this opinion is based on the reports of the Chilian explorers, to a great extent on those which we ourselves have formerly given and which we ratify by affirming that there is not a single Chilian river having its origin outside the Cordillera and to the east of it; and that neither is there any Argentine river having its source to the west of that system of mountains. . . . Chile has never pretended to carry its boundary by the plains of Patagonia—as Señor Pellegrini appears to believe—and always has sustained that this boundary *must run in all its extent within the Cordillera*, and for that reason she has called it, in all the Treaties, *divortia aquarum de los Andes*; and if in some cases it has been designated with the name of *continental divortia aquarum* or *interoceanic divortia aquarum*, this has happened because here (in Chile) all these expressions are considered to be synonymous, *which is a consequence of the idea that there is no river tributary of the Pacific coming from the Patagonian plains*.”

This opinion prevails in Chile and it is the consequence of the incomplete reports of Chilian explorers, who state that the continental divide occurs within the Cordillera, and even maintain that it is produced in the central line of highest summits that divide the waters flowing to one side and the other (Treaty of 1881), or in the main chain of the Andes (Protocol of 1893). Chile thinks, therefore, that the line proposed by her Expert corresponds to actual features of the ground. Her error in this point is evident.

The Chilian Representative, maintaining the same doctrine, informed the Tribunal at the Meeting of May 9, 1899, as follows:—

“ It is not a case of finding out which would be the best means to establish the boundary between two countries, but of complying with a solemn convention which has clearly and explicitly established that *Chile is divided from the Argentine Republic by the Cordillera de los Andes*, and that the dividing line should run over the highest summits which divide the waters, that is to say, over the *divortium aquarum*. Nevertheless, it will be demonstrated that such line offers the best conditions in order to make it serve as a frontier line. . . . It may not indicate the axis of the mountain chain, nor the highest points of it, but in all cases it embraces all the necessary conditions, as will be seen further

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\* Serrano Montaner, *Límites con la República Argentina*, Santiago, 1898.

on. The water-parting line is one of the topographical features easiest to be perceived and marked out on the land. . . . A simple ocular observation is sufficient to perceive where a river or a stream starts, and the natural direction that their waters take."

He quoted on this occasion the following words of the Chilian Expert :—

"The reason which the negotiators of 1881 had in view for taking as a boundary in the *Cordilleras* the water-parting line is the same as is recommended by the best principles of geography and of international law. It is in effect a unique line, easy to define and to discover and mark on the ground, being indicated by Nature herself, and not subject to ambiguity or errors."

Arguing on the convenience of the water-parting line as a boundary he adds :—

"The *divortium aquarum*, being usually situated on the *summit of a mountain*, has constituted the line of separation between countries, in like manner as the valleys and rivers which flow from it have also formed boundaries between two nations. In acknowledging this fact, the great majority of the geographers place the water-parting line among the features which constitute natural frontiers. . . . The water-parting line is the best topographical feature which a mountain or a Cordillera can offer for the fixing of boundaries. Besides, being the most clear and the easiest of perception, it combines other advantages which it is not possible to ignore. If the water-parting line does not always run precisely over the highest parts of the *mountains*, and if, in consequence of the irregular and capricious nature of this, it cannot run over the peaks and gigantic summits which rise here and *there on the lateral flanks* of a chain, it is evident that this line (the water-parting) maintains always in its course an average height more uniform, and that in any case it never descends to the deep valleys, which the rivers have excavated in descending from the heights to find an outlet to the lower land."

Can the regions marked with Nos. 301 to 310 of the Chilian line be said to agree with all the preceding considerations? Does the Cordillera de los Andes exist there? Does the *divortium aquarum* of the *Andes* occur in the zone? Is there to be found the line of the highest summits of the Andes which divide the waters? May that water-parting be considered as the best topographical feature for the fixing of boundaries? Is this line not subject to ambiguity and errors? Does that line follow the summits of a mountain range, and does it constitute a suitable line of separation between countries? Can the valleys and the rivers flowing from that *divortium aquarum* form a boundary between two nations? Have the great majority of the geographers placed a water-parting line like that existing there among the features which constitute a natural frontier? Do these



waters run from the opposite sides of a mountain chain, and maintain always an average uniform height?

Everyone who is acquainted with the ground will answer that not one of these conditions is there to be met, that the Cordillera de los Andes does not rise in those places, that nothing is more opposed to international requirements than the proposed Chilean line, and that no geographer recommends it as a natural boundary. Moreover, there do not exist mountain flanks at all, nor properly speaking what is understood as a "divide"; these lands may be considered "undivided" as to drainage, and the so-called "continental water-parting" occurs in a valley which in recent times the rivers descending from the eastern slope of the true Cordillera—to the west of the fancied one—have excavated, in their natural way to the Atlantic. The waters now flowing from meadows or swamps, in these Patagonian plains, are those which are considered in the Chilean statement as flowing from the highest summits of the main chain, while those really flowing from that main chain are not taken into account, as if they had no connection with the tracing of the line.

The ground itself is the best argument to destroy any defence of this part of the Chilean Expert's line, as the Commission to be appointed by Her Britannic Majesty's Government will be able to verify when visiting the region. Meanwhile it is convenient to mention the surveys recently carried out by the Chilean explorers.

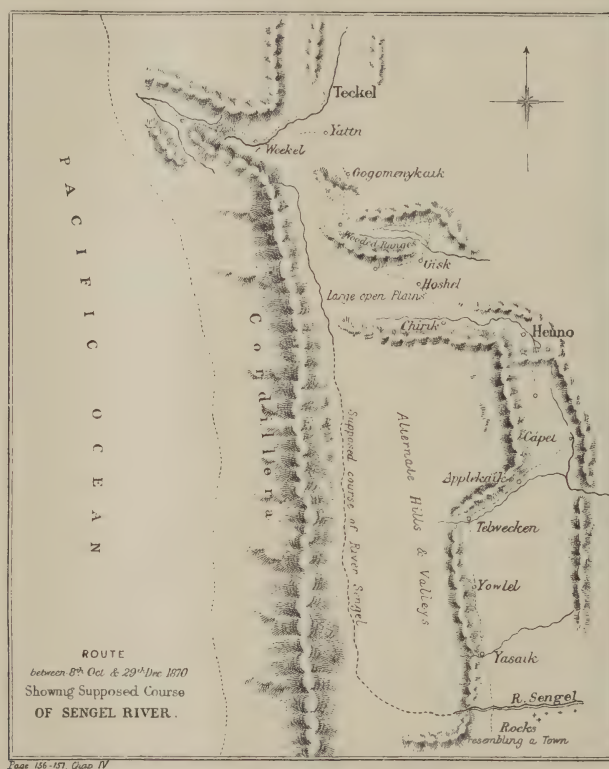
## 2. EXPLORATIONS CARRIED OUT IN THIS REGION.

Captain Chaworth Musters, during his journey in Patagonia, visited from October 8 to December 29, 1870, the region under consideration. He made some excursions with the Tehuelche Indians in these undulating plains, and his little sketch reproduced here\* shows that he always considered the "Cordillera" to be situated to the west of that region, and that he thought that the waters running there flowed towards the south into the Senguerr, tributary to the Atlantic. He only depicts a breach in the Cordillera—that of the Carrenleufu—but it must be observed that the condition on which he travelled prevented him making accurate observations on the true course of the rivers. The snowy barrier rising to the west of the plains was held as being the Cordillera from the

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\* At Home with the Patagonians, London 1871, reproduced by permission of Messrs. John Murray & Co.

earliest times, and shall continue to be so in the future ; Captain Musters taking it into account logically supposed that the waters of its eastern slope run to the Atlantic. Where Captain Musters represents the "large open plains" and the "alternate hills and valleys," the Chilian Expert tries to locate his imaginary main chain of the Andes.



MUSTERS, 1871.

(From *At Home with the Patagonians.*)

When in 1898 Dr. Steffen reconnoitred the northern and principal branch of the river Palena, Señor Roselot made an attempt to explore the southern one—the river Claro—as far as its source ; and after many efforts, he reached a lake which bears his name, observing that a snowy ridge bordered the river to the

east, and that it was cut by a watercourse flowing from the same direction, which he named the river Figueroa. This is the river Pico, which rises in the open ground far to the east of the Cordillera.

The natural obstacles of that mass of mountains and the torrential character of the river prevented the explorer from going further to the east. Señor Lange, of the Argentine Boundary Commission, surveyed more carefully those mountains in 1898, but he did not reach the eastern slope, having obtained however, sufficient geographical data to demonstrate that the snowy chain to which they belong is the main chain of the Cordillera (the chain of the boundary) in the summit of which the Argentine Expert has located his landmarks Nos. 296

at Nevado del Sur, and 297 at Mount Espe-  
ranza, and which sheds  
its waters to the river  
de la Torre, a tributary  
of the river Cisnes or  
Frías. In a second  
expedition, the same  
Argentine surveyor,  
Señor Lange, explored  
the course of the river  
Queulal, which was  
supposed from ancient  
missionary reports to  
rise to the east of the  
Cordillera, but it was



WATERFALL IN THE RIVER CISNES.

ascertained that its sources were in a secondary ridge to the west of the main chain.

At the same time Dr. Steffen explored the river Cisnes from its mouth in the Pacific Ocean to the interior, where it is called the river Frías, which name has been accepted by geographers. On January 3, 1898, he started from the coast. Continuous storms hampered his march until the 13th. On that day he was compelled to desist from navigating the river owing to a waterfall which is reproduced here from a photograph by the Argentine surveyors, who visited it soon after the passage of Dr. Steffen. He afterwards advanced for a few kilometres by the side of the river, which runs through lengthy gorges, being confined between perpendicular cliffs of rock rendering the route extremely

difficult. On February 16, it was found that the damp had damaged a large part of the provisions ; nevertheless the march was continued, although very slowly. In fifty days they had only advanced eighteen miles. Dr. Steffen then ascended Mount del Gallo (February 24 and 27) in order to ascertain his bearings. In his Report \* he states :—

P. 11.—“First of all we verified the fact that the gap of our river Cisnes, the *largest among the numerous visible Cordillera depressions, continues to the east for a considerable distance, forming a spacious valley, in the wooded alluvia of which one could see the shining curves of the river and its extensive shores.* Further on, the valley turns towards the north-east, and the river, shut in between the steep banks of the chains on either side, is lost to sight. Finally, the yellow gently rounded hills and mountain ridges, characteristic of the transitory region between the virgin forests of the Cordillera and the open Patagonian plateau, were clearly visible on the distant eastern horizon.

“Looking towards the south-west, the south and the south-east, the view embraced a labyrinth of *snowy Cordilleras, with numerous sharp peaks and steep crests.* At one point only can access be gained through that apparently impenetrable wall of high chains, for we discovered a deep and very extensive depression beginning in the river Cisnes valley almost opposite our halting place, and continuing first in a southerly, then in a south-easterly direction, and becoming lost to sight between the *high snow peaks* of that region. However, that which above all called our attention was the discovery of a lake, or rather a part of it, which was to be seen at the distant background of this depression, it being impossible, owing to the great distance and to the prolongation of its channel being hidden by far-projecting mountains, to discover its outlet, or gain an exact idea of its dimensions. It became necessary to go to the lake itself, to investigate its hydrographical system and to examine what was hidden by the south-easterly prolongation of the gap.

“In order, however, to extend our survey towards all points of the horizon, before beginning our return to the valley, we climbed another neighbouring chain slightly higher, which had previously limited our view towards the north and north-east.† From the summit of the ridge, which we called *los Huemules*, owing to our having killed two of these deer on its heights, the panorama of a rugged and absolutely unexplored mountain was revealed to us on the north. We ascertained the existence of several spacious valleys, extending in an E.S.E. direction, and which, beginning in the slopes of great snow-mountains, at the foot of snow-fields and glaciers, abut in the main valley of the river Cisnes, which was verified to be the receptacle for all the waters of the extensive Andean region visible from our point of observation.”

Such was the inclemency of the weather and the difficulty of traversing

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\* Informe sumario acerca del trascurso y resultados generales de la expedición exploradora del Río Cisnes (en la Patagonia Occidental), Santiago 1898.

† According to the indication of the aneroid, 1130 metres above the level of the valley (Note by Dr. Steffen).



the mountainous country, that he spent seven days in marching a distance of four miles in order to reach the lake. He describes the place thus :—

P. 12.—“We learned through the surveys made of the lake and its surroundings on March 7 and 8, that its outlet, hidden by dense underbrush and extensive *canutillares*, runs towards the river Cisnes, and that its only considerable affluent comes from the gap on the south-east which continues for a great distance between high snow ridges. The dimensions of the lake turned out to be much smaller \* than we had supposed owing to its bed being closed on the east by an imposing Andean block of fanciful shapes, resembling an enormous castle with numberless towers, the bare and perpendicular walls of which look as if they would repel all attempts to scale them.” †

That snowy block is the Mount La Torre of the Argentine map. On March 17, Dr. Steffen pursued his exploration of the river Cisnes, and, after many difficulties, he reached, on April 8, up to a point already visited by the Argentine Commissions. They had crossed the Cordillera de los Andes in sixty-five days and covered a distance of forty miles. Dr. Steffen thus described the region of the division of the waters between the Appeleg (which he calls Apulen) and the river Frías or Cisnes :—

P. 24.—“The march of May 3, continued in a W.N.W. direction, brought us to the region where the waters of the river Apulen and those which unite in the valley of the Cisnes or Frías river separate. Having crossed the main arm of the Apulen which flows out from a well-defined canyon on the south, all the streams are suddenly left behind, and one ascends by a gap between barren hills to a high plateau, a little over 1000 metres in height, from which can be seen small depressions of the ground which form the receptacles of the stagnant water in seasons of rain or thaw. The plateau, on which appear scattered groves of *raull*, is bounded on the south by hills forming the transition to high mountains which at that time were covered with snow. On the north the ground slopes gently down to a depression several kilometres wide, in which small rivulets flowing westward are perceived, and further on, in the northern limit of the depression, can be distinguished wooded hills and ridges whence there also flow rivulets which join with the above to form an arm of the upper Cisnes river. In the western prolongation of the said ridges, and in manifest orographical connection with them, rises the Mount Cáceres, which again we chose as point of orientation for our itinerary.”

Dr. Steffen having advanced some kilometres towards the west, adds :—

P. 24.—“From the level of the valley, which, at our chief encampment, rises to a

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\* It is oblong in shape, and somewhat resembles a pear; its length is three kilometres, its width only from one to two kilometres (Note by Dr Steffen).

† In the next pages it will be seen that this Castle Mountain is situated to the west of Lake La Plata.

height of 650 metres above the sea, one climbs by a series of very broad graduated hills, covered with grassy plains up to the wooded ridges, which may be considered the last eastern ramifications of the group of Mount Cáceres. The uniformity of its outlines is broken only by a multitude of small canyons, which descend in a southerly direction to the principal valley."

P. 25.—"That day (May 10), in the afternoon, for the third time we crossed the *divortium aquarum* which occurs in a region very similar to that which we described in crossing the dividing line between the valleys of Apulen and the river Cisnes. *An extensive undulating high plateau is here interposed between wooded ridges (the 'Bagnales Hill' of the Argentine maps), on the west, and a bare chain extending in a north to south direction at the eastern margin, while further on the rugged ridges, then covered with snow, are seen running parallel with the upper valley of the river Shamon, or Omkel, which unites with the Apulen far away in the open pampas.*"

Describing his return journey to the north, Dr. Steffen says :—

P. 26.—"We crossed several rivulets, tributaries of the river Shamon, the passage over which was rendered difficult by the tangle of undergrowth and the marshes on their banks, and having traversed a hill, 980 metres above sea-level, *we descended to the wide plain where rises the river Pico, which pertains, without doubt, to the Palena river system.* We traversed a series of canyons, all the waters of which flow towards the west and empty into the river Pico, which opens a way for itself to the west, through imposing snow massifs; and the following day we ascended to the northern edge of the plateau until we reached the platform of a broad pass, 1100 metres above the sea, which marks the watershed between the Pico valley on the south and the river Nerivao, an affluent of the Chergue, on the north. On the east, the gap is bounded by high hills, in the slopes and heights of which are seen, through the coating of glacial deposits covering a vast portion of the divisory zone, ledges of living rock; and on the west it is bounded by the extremities of the wooded ridges behind which the *snowy peaks* of the Upper Palena region are here and there seen.

"We afterwards crossed the Nerivao valley, on the margin of which according to an Uruguayan settler recently established in this district, there is good pasture land, but little ground adapted for agriculture. We continued our way in a northerly direction through high and stony pampas, which rise on the west to an unbroken series of southern ridges, marking the *divortium aquarum* with the valley of the Carrileufu or Upper Palena river. On the eastern side of our route were also another series of ridges, behind which extends the great Putrachoique depression through which the most frequented road of this region passes.

"We found ourselves surrounded in all directions of the horizon by mountains which, although they had not the absolute height nor the rugged and capricious configuration of the ranges and masses of the Cordillera in the neighbourhood of the Pacific,\* do not, for that reason cease to form part of the Andean system, within which, consequently, throughout

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\* The Cordillera here referred to, is the true Cordillera de los Andes where the boundary line is to run.

the tract traversed by the expedition, the continental water-parting occurs. It is true that the line of the *divortium aquarum* in these regions does not run over uninterrupted chains of snowy or thickly wooded mountains, such as those which obstruct the passes from the Pacific coast, and it is equally true that this line lies very much to the east of the congeries of snowy peaks, amongst which the series of "highest summits" should be looked for: but on the other hand, there is no reason to assume that the sources of the great rivers of Western Patagonia, which are formed in this region, such as the Cisnes, Pico and Palena, are 'at a distance no less than 50 kilometres to the east of the last spurs of the Cordillera.'\* Those who hold this opinion should prove, on orographical and geological grounds, that the Payahuehuen Sierras, the chains which border the upper valleys of Apulen and Shamon, and the mountains which border the Chergue rivulet, the Putrachoique Gap and the valley of the river Teeka, should be considered as forming no part of the Andean system. The zone of the high undulating plateau and the hillocks covered with glacial deposits, containing the *divortium aquarum*, from 45° to 43° S. lat., forms a kind of broad and continuous backbone within the Andean system, where by reason of the greater scarcity of humidity in the atmosphere, there extend dry and easily accessible lands very different from the western region of the Patagonian Cordillera, over the high crests of which all the abundance of the rains brought by the winds and storms of the Pacific Ocean are discharged."

All these quotations furnish evident proof that Dr. Steffen in his difficult explorations, passed right over the Cordillera de los Andes, and that the continental "*divortium aquarum*" occurs to the east of this Cordillera, as the Argentine Expert affirms. Dr. Steffen, nevertheless, insists on saying that the whole of that region belongs to the "Andean system," which term, it is to be noticed, he does not attempt to define, although he takes good care not to make it synonymous with "Cordillera de los Andes."

It has been already said that "Andean system" is an elastic expression, capable of being extended or contracted according to circumstances. For the way of reasoning of the Chilian Expert and surveyors every hill or hillock in South America might be considered as a part of the "Andean system," and in the statement read before the Tribunal its meaning has been so exaggerated that it has been extended to one hundred leagues "*from what is ordinarily called the Cordillera*," i.e. to near Falkland Islands. By thus arguing, the mountain ridges La Ventana and Curumalal in the Province of Buenos Aires to the N.E. of the port Bahía Blanca in the Atlantic Ocean, might also be held as pertaining to that enormous "Andean system." If the continental *divortium aquarum* might occur in those ridges,—which taking into account the phenomena which have

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\* Bolet. Inst. Geog. Argent., 1896, vol. 5-8, p. 215. Moreno, l.c. p. 94 (Note by Dr. Steffen).



modified the normal, scientific watershed of the Cordillera de los Andes, would not be extraordinary,—the Chilian Expert would have carried there a boundary which, according to the Treaties, must run *along the most elevated crests of the Cordillera de los Andes that may divide the waters*. Many thousands of miles of undisputed Argentine territory east of the summit of the Cordillera Nevada or Cordillera de los Andes would have thus been ascribed to Chile.

This new theory, which the term “Andean system” was intended to serve, raised some agitation, since it was never mentioned in the protracted Argentine-Chilian negotiations and even less in the Treaties in force between the two countries. That agitation ceased on the Chilian Government declaring that, according to their Expert, the line he proposed to the Argentine Expert is *entirely* situated in the Cordillera de los Andes, without mentioning the “Andean system” at all, a term which would only have tended to confusion where the clearest definition is needed.

Before his exploration of the river Cisnes, Dr. Steffen had occasion to examine the same Patagonian plains, and in the Reports of his journeys he expressed the same opinions on the geographical position of the Cordillera. In one of those Reports\* published in German, he states :—

P. 468.—“In the afternoon of March 27, 1897, Lieutenant Horn and I, with a troop of fifteen horses, guided by some Indians, took our departure from the *Tolderia*, and crossed the river Senguerr on the evening of the same day, which can be easily forded everywhere without danger, where it is divided into several branches. Further in a northerly direction continues the rolling plateau covered with big shingle and countless erratic blocks, and always at a short distance east of the main water-parting of the continent. The road is crossed by a number of large and small canyons which are sometimes quite dry and sometimes contain a little water, the course of which is usually indicated by thick shrub growth, often accompanied by luxuriant meadows and pasture land. On the 29th, the Arroyo Apele, and on the 30th, the Shauman (or Onguel), which unites further down with the river Jenua, were passed, and immediately we took the most direct route northwards through the canyon of Putrachoique, the waters of which produce the most northerly branch of the river Jenua.

“The plateau must be on an average about 800 metres above the level of the sea, and rise gradually to the west towards the foot of the Cordilleras, so that from the route taken by the expedition little was to be seen there but the endless chain of mighty snow-capped peaks, and the highest part of the central massifs. Now and then isolated deep breaches were visible, through which large, chiefly quite unexplored rivers made themselves a way to the Pacific Ocean through a labyrinth of mountains. *A cold, dry wind blew continually*

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\* Verhandlungen der Gesellschaft für Erdkunde zu Berlin, vol. 24, 1897.



from the Cordillera down over the plateaux and frequently assumed a stormy character. In the night, the thermometer often fell below zero: the minimum in the night of March 29 to 30 was observed to be  $15\cdot5^{\circ}$ . After a long ride over stony, waterless pampa we reached on April 2 the beautiful valley of the river Tecka, a southern tributary of the river Chubut."

In this Report Dr. Steffen, while travelling across the *continental divide*—which the Chilian Representative confounds with the *divortium aquarum de los Andes*—shows that he found himself far to the east of the Cordillera, without stating that he was in the "Andean system." In the Spanish Official Report\* on the same expedition there are not to be found the details recorded in the German publication, but it is said in it:—

P. 108.—"Conducted by an Indian guide we took our departure from the *Tolderia* with fifteen horses, and after crossing river Senguerr on the evening of the 27th, we proceeded northward over hills and tablelands of barren pampa, at a short distance to the east of the dividing line of the continental waters. We crossed a great number of large and small canyons, some quite dry, others fed by small rivulets, winding through beautiful meadows fringed by scanty bushes and vegetation. . . . The undulating plain, in which the said canyons make deep incisions, has an average elevation of 800 metres above the sea-level, and gradually ascends towards the west as far as the foot of the spurs of the Cordillera, behind which were seen a long series of snowy peaks, interrupted by the wide openings of the rivers which seek a passage into the Pacific Ocean. There constantly blew a cold, dry wind from the west, which at times assumed the proportions of a regular hurricane, and the thermometer in the night often fell below zero."

Although it is not stated in this Report, as it is in that published in German, that the snowy peaks belong to the *central massif* of the Cordillera, nor that the wind comes from the Cordillera, the conclusions to be derived from both are identical, the traveller pursued a course to the east parallel with the eastern spurs of the Cordillera de los Andes.

At the same time that Dr. Steffen was exploring the northern arm of the river Aisen, his assistant Señor Fischer was exploring that of the south and east, and referring to his march to the north, in the same Spanish Report he states:—

P. 118.—"On the 22nd (March 1897), we went northwards by the pampa following the foot of the spurs of the Cordillera. On the 30th, we deviated to enter the upper valley of the Palena river (or Corcovado, which is the name given to it in the pampa).†

\* Informe preliminar sobre la expedición exploradora del Río Aisen, etc., presentado al Señor Ministro de R.E., C. y Colonización por Dr. Juan Steffen, Santiago, 1897.

† That is to say in the region of the *divortium aquarum* as there are the settlements visited by the explorers.

*From here we followed to the west of the 'divortium aquarum' until we left the Valley 16 de Octubre."*

Thus according to the two explorers in the service of Chile in 1897, the "undulating plain" where the "*divortium aquarum*" occurs, is situated to the east of the spurs of the *Cordillera de los Andes*. In pages 400 and 401 two photographs taken from Dr. Steffen's Spanish Report have been reproduced: one represents the summit of the Cordillera in Mount Gallo; the other shows the region where the river Cisnes has its source. A glance at them will suffice to ascertain that the so-called continental water-parting occurs in a region where it is impossible to maintain that the main chain of the Andes is located.

Señores Steffen and Fischer were the first Chilean explorers who visited that region. The present Argentine Expert had the previous year acquainted the Chilean Expert with the results of his journey to Lake Buenos Aires and had pointed out to him his mistake in maintaining that the continental "*divortium aquarum*" in the sources of the rivers Aisen, Palena, etc., is produced within the Cordillera. It was in consequence of this that Señor Barros Arana ordered the exploration to be made by Señores Steffen and Fischer. They thus visited certain parts of the region referred to, and they found on the ground such a clear proof of the fact asserted by Dr. Moreno, that notwithstanding their efforts in defending the Chilean Expert's theories, their official accounts and reports show that they had visited the region of the "*continental divortium aquarum*" at the source of the Palena, that it is really situated to the east of the *Cordillera de los Andes* and at such a distance from its foot, "that from the route taken by the expedition little was to be seen there (to the west) but the endless chain of mighty snow-capped peaks and the highest part of the central massifs."

It is evident, without any doubt whatever, that the continental "*divortium aquarum*" occurs at the sources of the Palena in its Pico branch, at the Cisnes in its Frías branch, and in many other parts, to the east of the *Cordillera de los Andes*, so that it must be eliminated from any discussion concerning the Argentine-Chilian boundary. Notwithstanding this and the declaration of his Government expressed in the Record of September 22, 1898, the Chilean Expert, in his efforts to maintain the "continental divide" doctrine, has appealed to the "Andean system" to seek the boundary therein, setting aside the *Cordillera de los Andes*, which is the only feature along which, according to that Record and to the Treaties in force, the divisory line must be traced. This newly discovered limit

in the "Andean system" has been completely unknown during the framing of the Covenants, and is a pretension that borders upon the absurd. It has apparently been introduced only to raise fresh fruitless discussion.

### 3. GENERAL CONFIGURATION OF THE GROUND.

Cases have been mentioned of mountain chains which, serving as boundaries, are cut by rivers, and it has also been shown that nations do not rigidly adopt a continental divide as the limit between them; but Chile, in spite of these antecedents and of the existing Treaties, maintains that such a line, inconsistent and constantly changing in the region under consideration, should be accepted as a proper frontier. It should be borne in mind that while a watershed is a good boundary when it follows the summit of a mountain chain, it may under certain circumstances be most unsuitable. What permanent watershed boundary can exist between the river Mississippi and the Red River, the Casiquari and the Orinoco, the Manso and the Paraguay? Supposing that Bolivia and Perú had agreed to adopt a watershed as the boundary, where could the line run in the neighbourhood of Lakes Titicaca and Pópoo? The river Desaguadero connecting them sometimes flows into the former, but generally into the latter lake. The watershed mentioned in the Treaties between Argentina and Chile is only that of the Andean crest, a primary watershed which is not altered in any manner by the fact that the range is cut by rivers flowing from the eastern slope or from the plains to the east of it.

Professor W. M. Davis says, "high mountains serve as barriers separating the climates and the populations of their opposite sides."\* The orographical

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\* *Physical Geography*, Boston and London, 1899, p. 176. He adds:—P. 177.—"The great populations of India and China, representing different races, are separated by the Himalaya, and other ranges in Southern Asia. They are thus so well held apart that neither one has had an important influence on the other. Lofty mountain ranges thus rank with the oceans in separating the inhabitants of the lands.

"When low countries on opposite sides of a high range are occupied by different peoples, the mountains commonly serve as a natural boundary between the two countries. The range as a whole may serve as a rough boundary between uncivilised nations; but between civilised nations the crest line dividing the rivers of the opposite slopes is often accepted as a more precise boundary, as in the Pyrenees between France and Spain, where the river divide is generally adopted as the national divide.

"When the river divide departs from the main range that it was supposed to follow before the mountains were explored, the boundary question may give rise to dispute, as recently between Argentina and Chile, where a number of Pacific rivers rise on the Pampas of Patagonia, and cut through the Andes in deep gorges."

The last part of the quotation contains an error due to the statements of the Chilian Expert. The river



and climatic conditions of the Cordillera de los Andes are characteristic features impossible to be misunderstood, and their change between the one and the other slope is produced in the centre of the range, as has been recognised by the Chilian explorers. Señores Bach and Kastrupp of the Argentine Boundary Commission, who ascended the Palena, Carrenleufu and Cisnes rivers from the Pacific coast, had forty-nine days of rain upon the western slope of the Andes, out of the sixty-four that the journey lasted; Señor Lange of the same commission, who explored the river Claro, the Lake Roselot, and the river Queulal, situated to the west of the main chain, had forty-one days of rain and only nine of fine weather; and mention has already been made of the hardships that, owing to storms, Dr. Steffen endured during his ascent of the rivers Cisnes and Frías. In the eastern slope of the main chain as understood by the Argentine Expert, the climatic conditions are very different.

The region drained now by the tributaries of the southern branch of the Palena, and by those of the river Cisnes, to the east of the Cordillera, is intimately connected with the valley of the Tecka, the southern affluent of the river Chubut. That connection has been recognised by the Chilian explorers, since they consider as a southern part of the Teca valley, the valleys of Putrachoique and Cherque, the waters of which flow to the river Genua, a tributary of the Senguerr. The Tecka valley is bordered on the east by the Quichaura ridge, that, as can be seen in Plate LXXXVIII. Fig. 1, is of very little importance, its greatest height not attaining 700 feet above the general plain. These hills are prolonged to the south by the Tepel or Tepuel and Putrachoique Hills, and by the Genua, Omkel and Appeleg Hills, which do not properly belong to the "Andean system," and much less to the boundary Cordillera.

The Chilian maps reproduced in Plates XV. and XXV. give to these small ridges the names of "Cordillera de Tepuel," and "Cordillera de Cherque"; but as has been said, the word Cordillera is sometimes applied by the Chilian

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divide has never been agreed upon as the boundary between Argentina and Chile. The divide is that of the high crest of the Cordillera, and the line must pass between the slopes that separate the waters running from that crest, which is considered to be formed by the main chain of the Andes. The boundary line passes across the rivers flowing from one side of the main chain to the other and cutting the main chain.

Professor Davis continues:—"The difficulty of crossing lofty ranges gives great importance to the notches or *passes* in their central ridges, through which travel and traffic may go with less effort than over their peaks." This importance is recognised in the Argentine-Chilian Treaties as, according to them, the landmarks must be located in these notches or *passes*; but what *passes* and notches can be seen in the proposed Chilian line between the landmarks 301 and 310?



FIG. 1.



THE TECKA VALLEY AND THE QUICHAURA RIDGE, FROM THE EAST.

*La Piedra Hill*  
(1150 m.; 3773 f.).

*Diablo Hill*  
(1240 m.; 4068 f.).

FIG. 2.



S.

LA PIEDRA AND DIABLO HILLS.

W.

[Face p. 960.]



geographers to hillocks and even rising ground, and it must be considered that it is in this sense that the term is to be understood as regards Tepuel and other low hills. This has, however, resulted in serious confusion with reference to the orographical features, which confusion is increased by the suppression in these maps of the term "Cordillera de los Andes," from the high range of the west.

Between this series of little ridges,—which ends to the north of the river Senguerr,—and the base of the spurs of the Cordillera, in the extensive plain, carved by ice and fluvial erosion, the so-called continental divide occurs. The fluvio-lacustrine beds, which principally form the plain, covered with morainic material, are of the same character as the beds extending far north in Tecka. Carrenleutu, 16 de Octubre, Esguel, Cholila, Maiten, fjords of Nahuelhuapi. Quilquihue, etc., and its present drainage is due to the same causes.

Crossing by the carriage-road from Tecka to Genua the southern part of this general valley is reached, leaving to the east the hills of Tepuel, and to the west those of Putrachoique. Plate LXXXIX., Fig. 1, and Plate LXXXVIII., Fig. 2, reproduce photographs taken from the southern end of Putrachoique, near Nirehuao stream. The first represents part of the Tepuel ridge, the valley (830–930 metres; 2723–3051 feet) between this ridge and Putrachoique Hills (1145–1165 metres; 3757–3822 feet), and to the west of these hills, the plains extending towards Catango. The second carries the panorama further to the west, although there is a slight break in its continuity. The plain mentioned extends in it as far as the Diablo Hills, 1050 to 1240 metres (3445–4066 feet) high, and continuing to the south-west is seen Piedra Hill, a "monadnock" (1150 metres; 3773 feet), losing its slopes in the fluvio-lacustrine plain, where in the southern part, rise waters which flow to the Pacific and to the Atlantic in a district of numerous rivulets and pools, situated in the glacial deposits.

Plate LXXXIX., Fig. 2, represents Tepuel, Putrachoique and Diablo Hills, seen from a point situated to the south-west of the latter, at a height of 840 metres (2756 feet). Plate XC., Fig. 1, represents the continental divide between the western sources of the Cherque stream and the eastern sources of the rivulets tributaries of the river Pico, in a fluvio-glacial terrace, at an altitude of 1161 metres (3809 feet) above the sea. This terrace is the upper one, representing the *general level of the plain of Patagonia* in this latitude before erosion had cut out the small valleys and canyons; its level is higher than many of the mentioned little ridges, which rise in the deep valleys.

Plate XC., Fig. 2, contains a continuation of the same horizontal line from north to east by west, showing to the west the foothills, and further on the first snowy peaks of the Cordillera. This is the "pampa alta pedregosa," so called by the Chilian Boundary Commission and which Señores Steffen and Fischer crossed, observing that to the west "the snowy peaks of the upper Palena region are here and there seen." To the upper Palena region, however, part of that plain abnormally belongs, as the waters are now flowing to that river, and the snowy peaks referred to pertaining to the Cordillera are situated in the midway between the sources previously mentioned and the Pacific coast. The Palena waters cut across the Cordillera in spite of the erroneous affirmations of Señor Serrano Montaner.

Plate XCI., Fig. 1, is a photograph taken a little to the west of the preceding one, and shows where the "continental divide" is there to be found, i.e. where the Chilian Expert locates "the main chain of the Andes." Fig. 2 of the same Plate contains the region to the west of the former. The river Pico is represented in its main valley flowing through the plain to the Pacific; its geographical situation in relation to the Cordillera may be recognised by the snowy mountains which rise far to the north-west, and which are situated in the true Cordillera de los Andes, to the W.S.W. of Lake General Paz. The hillocks to the west are only vestiges of the high fluvio-glacial terraces in which the river has excavated its valley. The panorama contained on Plate XCII., Fig. 1, is a characteristic view of the plateau where the continental water-parting occurs, comprehending from the north-west to the south-east by west the sources of the tributaries of Omkel and Cherque streams which flow into the Senguerr river, and the south-western tributary streams of the river Pico. The first foothills of the Cordillera are seen to the north-west and west, and to the south-west and south the rising ground of Baguales, which is considered as a high hill by the Chilian geographers, while in reality it is only an isolated eroded part of the general plain. To the south-east, the plain stretches out, cut by the tributaries of the Omkel stream.

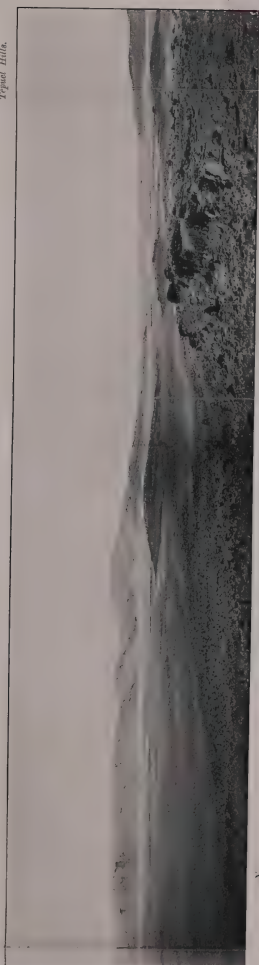
Passing to the west, the first spurs of the Andes are more visible, but the general plain does not change in its features, although vegetation is more developed owing to the dampness of the region. In Plate XCII., Fig. 2, the first snowy ridges are seen to the north of Lake Pico (the lake itself is invisible in the plate, as it is situated in the hollow of the valley); to the south-east appears the rising ground of Baguales, and between this and the plain the hollow of the



FIG. 1.

*Patagonian Hills.*

*Tepuel Hills.*



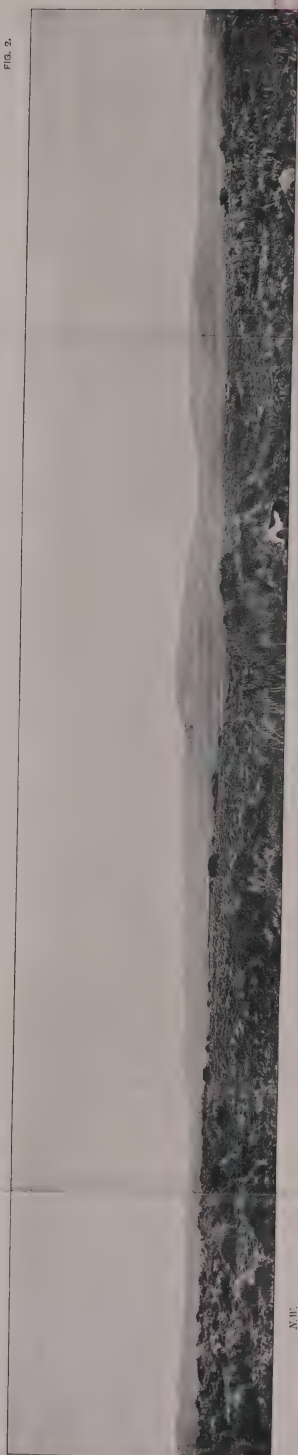
N.

PANORAMA FROM NIREHUAO STREAM.

E.N.E.

*Tepuel Hills.*

FIG. 2.



N.W.

VIEW OF TEPUEL HILLS FROM NIREHUAO STREAM.

S.E.

*Tepuel Hills.*



FIG. 1.



E

CONTINENTAL DIVIDE (BETWEEN RIVER PICO AND CHERQUE STREAM).

N.E.

Photograph taken from the plain of Cherque (815 m.; 2674 f.).

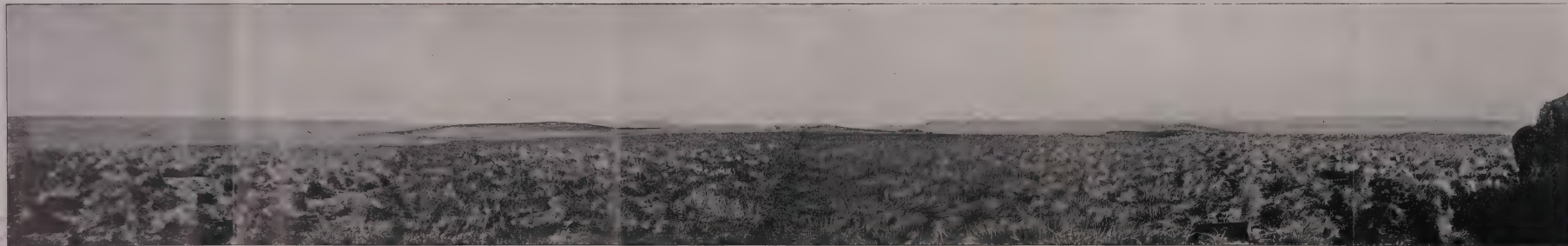
*Bañoses rising ground.*

*River Pico.*

*The Eastern Ridge of the Cordillera to the N.W. of River Pico.*

*The Northern Table-land.*

FIG. 2.



S.W.

W.

N.W.

N.

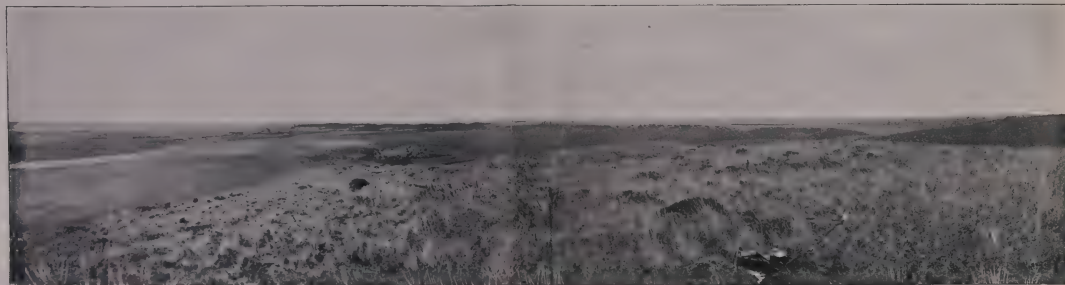
THE REGION OF THE CONTINENTAL DIVIDE FROM THE TERRACES TO THE EAST OF RIVER PICO.

(Plate p. 881.)





FIG. 1.



*Tributary to the Ouel Stream.*

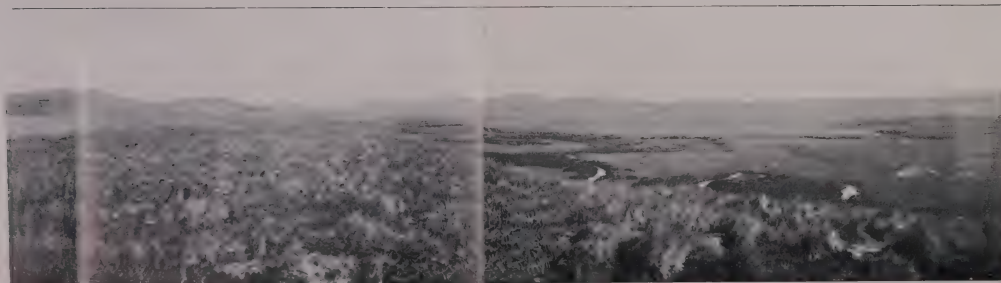
CONTINENTAL DIVIDE IN THE CHERQUE PLAIN.

*La Mula Stream.*

*Mount Demado*  
(2280 m.; 7481 f.).

*Mount to the West of Lake Poz*  
(2196 m.; 7206 f.).

FIG. 2.



W.

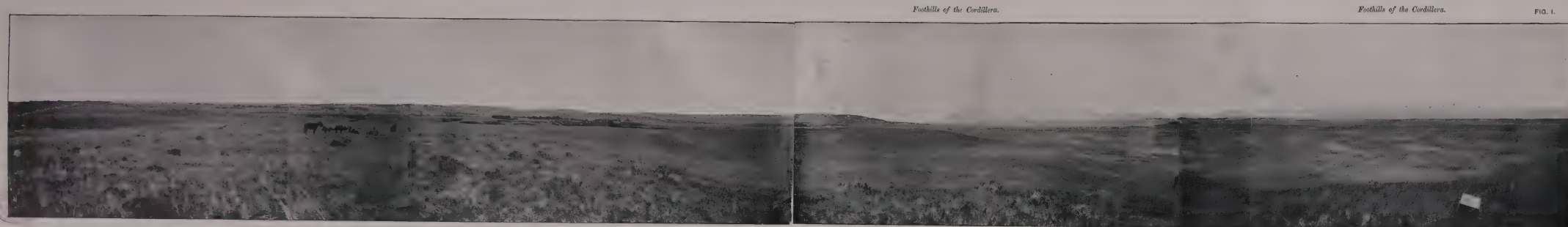
RIVER PICO IN THE VALLEY OF THE GENERAL TABLE-LAND.

N.W.

*River Pico.*

[Face p. 602.]





*Foothills of the Cordillera.*

*Foothills of the Cordillera.*

FIG. 1.

S.E.

W.

N.W.

THE PLAIN OF THE CONTINENTAL DIVIDE FROM THE SOUTH-EAST OF RIVER PICO.



*Lake Pico.*

*Eastern Ridge of the Cordillera to the North-West of River Pico.*

FIG. 2.

S.E.

*Baguales Rising Ground.*

N.W.

THE PLAIN TO THE WEST OF THE CONTINENTAL DIVIDE AT RIVER PICO.

[Place p. 862.]





northern affluent of the river Frías, which also has excavated its valley in the plain. Plate XCIII. represents, between Baguales and a basaltic prominence, the plain, to the east of the latter where the divide of the Omkel stream and the river Pico occurs.

The photograph in Plate XCIV., Fig. 1, has been taken from the west of "Loma Baguales": the landscapes are more varied as they approach the Cordillera, the first ridges of which are seen to the west. The little lakes to the south of Lake Pico are shown in the valley, and Cáceres Hill, which is merely the upraised edge of the Patagonian tableland (1510 metres, 4954 feet) appears in the distance to the S.S.W. To the east is Loma Baguales.

Plate XCV., Fig. 1, represents the top of "Loma Baguales," and is a convincing proof that no mountain gap is there to be found, but on the contrary, the level of the general plain where the continental divide is produced, as there are the sources of Omkel stream, and rivers Pico and Frías. Cáceres Hill shows its tableland character to the south-west, and to the west rises the snowy Cordillera. In Plate XCIV., Fig. 2, appears the ground around Lake Azul—to the E.S.E. of Loma Baguales—where a true and clear divide is not to be found as the waters run from the same pool to the Atlantic and to the Pacific. According to the Chilian Expert, therefore, this pool must be considered as the main chain of the Andes.

In connection with this case, it is well to quote the following paragraph from Morris Davis:—

P. 230.—"The land from which a river gathers its water and rock waste is called its *basin*. The crest line between the slopes leading to different streams or rivers is called a *divide*. On smooth plains and uplands there may be no noticeable crest line separating the side streams of neighbouring rivers. Such surfaces may be described as *undivided* as to drainage. Undivided areas are often found on young plains and plateaus. When a plain or plateau is well dissected, numerous *subdivides* are developed, as on the Alleghany plateau. The rivers of vigorous mountains are sharply divided by the crest lines of the lofty ridges between the deeply eroded valleys. A worn-down region may have indistinct divides, as on the Piedmont district of Virginia, or on the uplifted, but not yet well-dissected plains of eastern Montana."

These words may be applied to the present case. In the region under consideration, in its smooth plains and uplands there is not a noticeable line separating the side streams of neighbouring rivers, and such surfaces may be described as "undivided as to drainage." The "vigorous mountains" referred to are all far to the west, as is seen in Plate XCV., Fig. 2, in which are very

distinct the dry bed of one of the old streams cutting the drift terrace, the wooded top of Cáceres Hill, and the low plains across which wind the northern tributaries of the river Frías and the southern of the river Pico. The first high eastern spurs of the Andes bound that plain to the west. Plate XCVI., Fig. 1, is from a photograph taken from the east of the Lake Segundo, to the south of Lake Pico, and gives a good idea of the landscape to the west of this plain; from north to south by west extend the first spurs of the Cordillera. Cáceres Hill shows its smooth extensive back as a denuded vestige of plateau,



CÁCERES HILL FROM THE NORTH-WEST.

and to the south-east is seen the north-west slope of Loma Baguales, which also pertains to the carved plateau.

The figure inserted herewith clearly demonstrates that Cáceres Hill has not an Andean feature, and confirms what has been said as to its being only a remainder of the denuded tableland. The ground to the east, south-east and south of Cáceres Hill belongs to the basin of the river Frías, some of the sources of which are close to those of the Appeleg, tributary of the river Senguerr. Plate XCVI., Fig. 2, represents this ground to the east and shows the denuded



DIVIDE BETWEEN RIVERS FRÍAS AND PICO, FROM THE WEST.

*Bugadus rising ground.*





*Baguales rising ground (1307 m.; 4288 f.).*

*Gloves Hill (1510 m.; 4954 f.).*

*Eastern Ridge of the Cordillera de los Andes.*

FIG. 1



S.E.

S.

S.W.

W.

N.W.

REGION TO THE WEST OF THE CONTINENTAL DIVIDE—UPPER VALLEYS OF RIVERS PICO AND FRÍAS.

*Baguales rising ground.*

FIG. 2



S.

LAKE AZUL SEEN FROM THE EAST.

N.

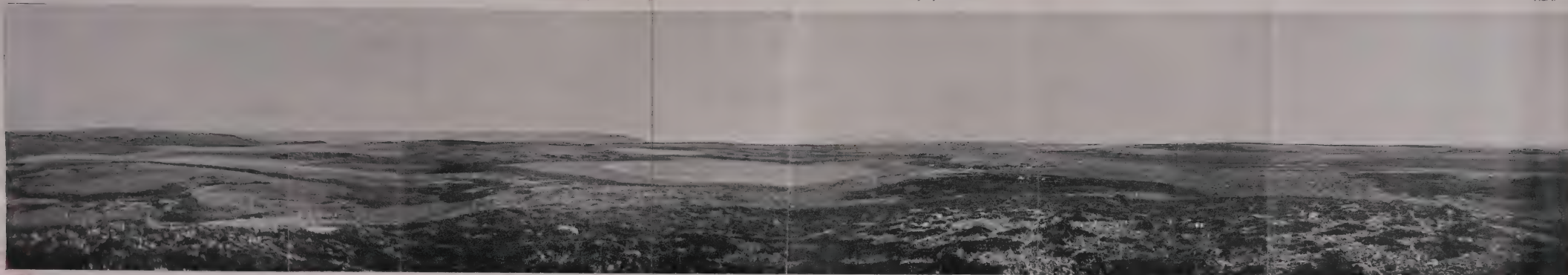
(Face p. 883.)



*Cóncora Rising Ground.*

*Eastern Ridges of the Cordillera.*

FIG. 1.



S

W.

N.

THE TOP OF "LOMA BAGUALES," OR CONTINENTAL DIVIDE TABLE-LAND.

*River Frías.*

*Eastern Ridges of the Cordillera.*

*River Pico.* FIG. 2.



*Loma Baguales Rising Ground.*

EASTERN RIDGES OF THE CORDILLERA DE LOS ANDES FROM RIVER FRÍAS.

*Cóncora Hill.*

[Face p. 868.]





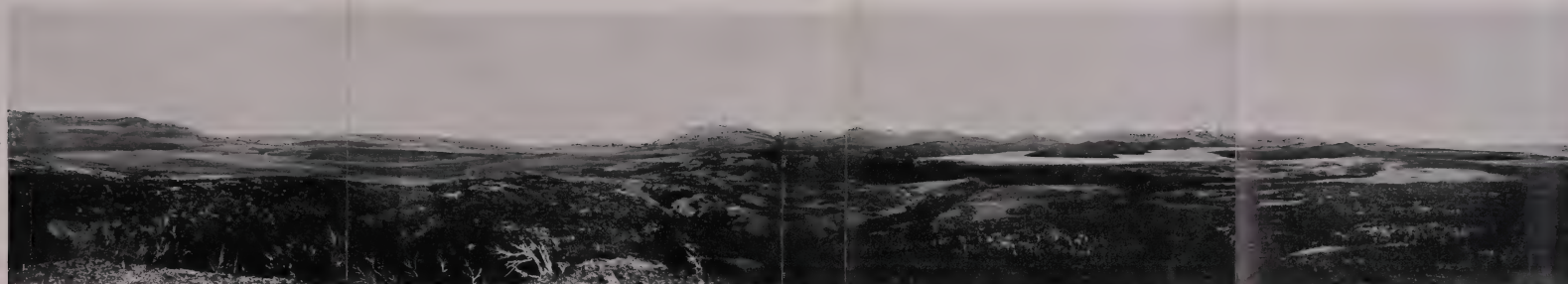
*Choceros Hill.*

*The Eastern Ridge of the Cordillera.*

FIG. 1.

*Diapales rising ground.*

*Table-land.*



S.E.

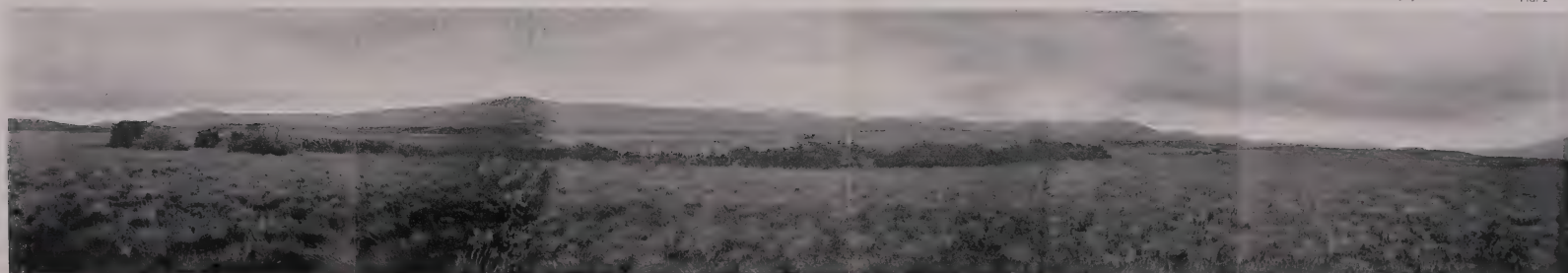
S.W.

N.

THE REGION TO THE WEST OF THE CONTINENTAL DIVIDE. VALLEY OF RIVER PICO.

*Valley of River Pico.*

FIG. 2.



E.

S.

W.

TABLE-LAND WHERE RIVER FRÍAS ORIGINATES.



plateau bounding the low valley, where the river runs; to the south are seen the mountains of the group situated to the north and north-east of Lake La Plata, whence the river comes, rising at Cumbre Negra, 1912 metres (6273 feet). This group undoubtedly belongs to the Pre-Cordillera. The river Frías, flowing from south to north, turns rapidly to the west, when it reaches the open plain, formerly the bed of a great lost lake. In a photograph inserted in the text, the mountains of that Pre-Cordillera group are represented.



ORIGINS OF THE SOUTH-EASTERN ARM OF THE RIVER FRÍAS IN  
THE PRE-CORDILLERA.

Returning to the north, to the low plains of Cherque and Omkel streams, the Commission to be appointed by Her Britannic Majesty's Government will find that the plain of the "continental divide," crossed by the Chilian Expert's line, is so uniform in its features that it is impossible to consider it as a part of the Cordillera, that only small characteristic prominences, left by ice-moraines, can be distinguished, and that these have been burrowed in every direction by the streams, the beds of which are now dry. The valley of Temenhua stream shown in two figures inserted in the text modifies very little the extensive

general level represented in Plate XCVII., Fig. 1. The "pampa" of Cherque (920 metres, 3018 feet) is bounded to the east by the Omkel Hills, the heights of which are about 950 metres (3120 feet). Fig. 2 of the same plate shows another case of "continental divide"; to the east are the small hills of Cherque, but to the north, west and south the plain is developed (1028 metres, 3373 feet), and there the sources of the Las Mulas stream, a tributary of the river Pico, and of the Omkel stream are to be found. Plate XCVIII., Fig. 1, is a more detailed representation of that interoceanic water-parting that the Chilian Expert con-



THE VALLEY OF TEMENHUAO STREAM.

Ancient bed of a river outlet of the Lake Pico before the cutting of the main chain ;  
View to the west.

siders as being the main chain of the Andes. Fig. 2 of the same plate, taken from a point near the Omkel Hills, which culminate in 1322 metres (4338 feet), shows how the plain has been worn by river erosion, but does not supply any orographical or geological evidence by which that region can be proved to belong to the "Andean system"; and Plate XCIX., Fig. 1, shows that instead of mountain ridges, there is only a plain covered with glacial material, and furnishes fresh evidence of the changeable character of the continental divide. Further south, the region has the same aspect. Plate XCIX., Fig. 2, is an



FIG. 1.



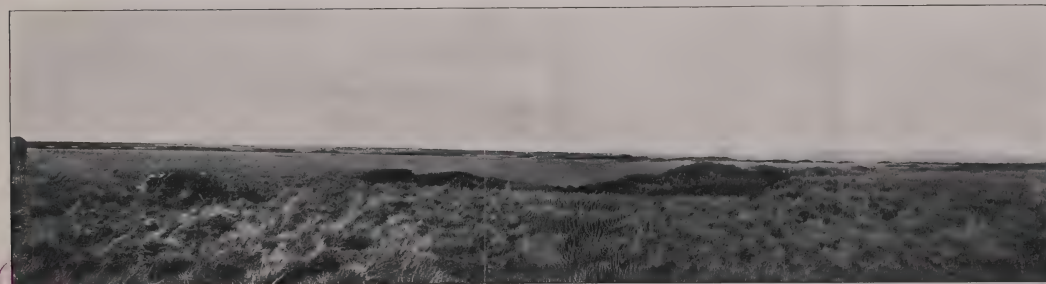
*Onkel Hills*  
(1322 m.; 4337 f.).

*Continental Divide.*

*Valley of Cherque.*

THE PLAINS OF THE CONTINENTAL DIVIDE TO THE SOUTH OF CHERQUE STREAM.

FIG. 2.



*Origins of Onkel Stream.*

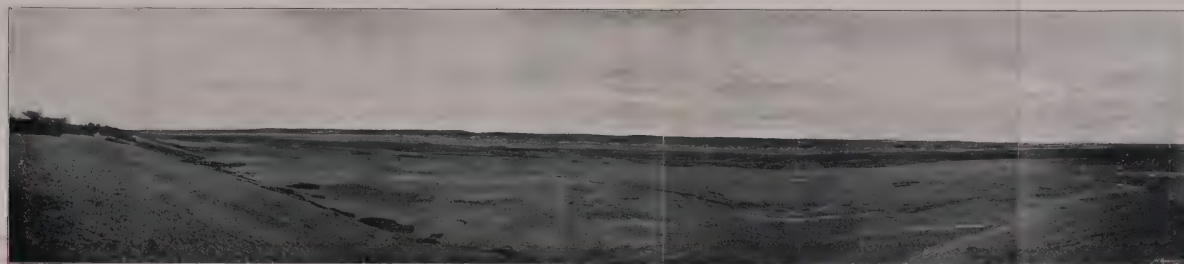
THE CONTINENTAL DIVIDE PLAIN.

*Hills of Cherque*  
(1195 m.; 3920 f.).

[Face p. 868. —



FIG. 1.



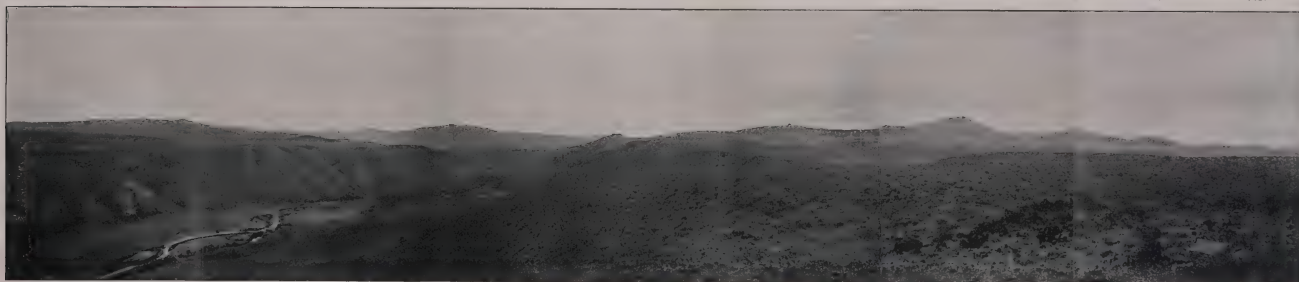
W.

CONTINENTAL DIVIDE. SOURCES OF THE STREAMS TEMENHUAO AND OMKEL.

N.E.

*Omkel Hills*  
1312 m.; 4337 f.

FIG. 2.



N.

N.E.

OMKEL STREAM AND THE MORAINES WHICH BORDER IT.

E.





*Omkel Hills.*

FIG. 1.



*Valley of Omkel.*

*N.E.*

THE MORAINIC TERRACES IN THE CONTINENTAL DIVIDE.

*Appeleg Hills.*

FIG. 2.



*N.*

*E.*

*S.*

THE PLAINS OF THE CONTINENTAL DIVIDE BETWEEN OMKEL AND APPELEG STREAMS AND RIVER FRIAS.

11 Feet 8 in.



extensive panorama, needing no description, of the same continental divide between the sources of the rivulet Los Patos and the Appeleg stream, 950 metres (3117 feet). The hills of Appeleg do not rise to a great altitude, being only about 1214 metres (3983 feet) above the sea. Plate C., Fig. 1, is a reproduction of the same region a little farther east; the Appeleg Hills rise from the plain,—the pampa of the river Frías valley,—where the sources of Patos rivulet, 880 metres (2887 feet), are also shown.

Plate C., Fig. 2, shows local details of the continental divide in the Appeleg Valley, and exhibits its morainic aspect, and Plate CI., Fig. 1, a photograph



TEMENHUAO STREAM. VIEW TO THE EAST.

taken close to the west of the Appeleg Hills at 1117 metres (3665 feet), shows the dry bed of a lake where the continental divide, 920 metres (3018 feet), exists between other tributaries of the Appeleg and Frías. Fig. 2 of the same plate is taken from the terraces of the general plain, to the west of the bend of the river Frías, where it changes its north and south course to a westerly one; Cáceres Hill shows its form of monadnock, and it is useless to pretend to refer it to the Cordillera de los Andes. In Plate CII., Fig. 1, are represented eastern and southern views; the Appeleg Hills appear with their very little prominence as mountain features, while to the south, the Pre-Cordillera, with its snowy

peaks, is clearly shown. The Pre-Cordillera disappears between Mount Cuche and the region immediately to the north of Lake Fontana, and in that stretch lies the large plain where the continental divide is as complicated as inconsistent. The Appeleg, Omkel, Genua, Tepuel, Putrachoique and Quichaura Hills are not properly within the limit which can be assigned to the "Andean system," as the photographs reproduced demonstrate it sufficiently. Plate CII., Fig. 2, taken from the same terraces as the last two, shows Loma Baguales to the north of the plain where the divide occurs, and Cáceres Hill between the terraces and these hills; on a rising ground flows to the west the river Frías, while to the W.N.W. of the same hills, the first snowy ridges of the Cordillera are to be seen.

All these photographs render unnecessary a detailed description of the ground where the Chilean Expert has located Nos. 301 to 310 of his line, as a mere glance at them is sufficient for the purpose of again proving that when proposing this part of the line he has completely forgotten the requirements of the boundary agreed upon in the Treaties.

The Ñirehuao stream, to the east of the Diablo Hills, empties itself in the river Genua, where it joins the Cherque stream. These waters cut the ridge of Tepuel which continues to the south by the hills of Cherque, Omkel and Appeleg, varying in height from 900 to 1170 metres (2953 to 3839 feet), scarcely 200 metres (656 feet) above the average level of the undulating western plains. The heights to the west of Cherque stream, in the region of the continental *divortium aquarum*, are 910, 955, 880, 780, 795, 870, 770, 815, 785, 900, 850, 1050, 950, 700 and 815 metres (2986, 3133, 2887, 2559, 2608, 2854, 2526, 2624, 2575, 2953, 2789, 3445, 3117, 2297, 2674 feet) above the sea, and they correspond to level terraces, glacial mounds, and old channels of rivers and lakes.

The Temenhuao stream,—the eastern part of the river Pico,—which rises in the same plain between 800 and 900 metres (2625–2953 feet), bends to the west, and then descends gradually to 725, 620, 554, 522, 500 metres (2379, 2034, 1818, 1713, 1640 feet) and so on, until it penetrates, twenty miles further to the west, in the eastern spurs of the Cordillera. At the height of 500 metres (1640 feet) it receives the waters of Lakes Pico and Segundo del Sur. The latter, situated in the plain of the south, has an altitude of 770 metres (2526 feet), while the former lies at 550 metres (1804 feet) above the sea.

This excavated plain bordered by the valleys of the present streams, attains, starting from the level ground of Cherque, towards the west, 1050, 1028,



*Appleg Hills*  
(1214 m.; 3963 f.).

FIG. 1.

*Continental Divide.*



*Valley of River Frías.*

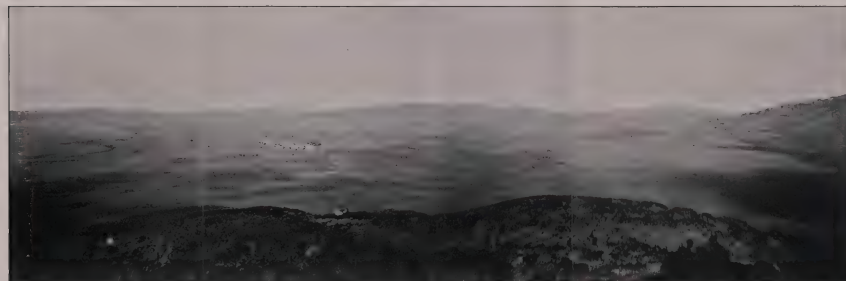
*E.*

*Sources of La Pato Stream.*

*SSE.*

PLAIN OF THE CONTINENTAL DIVIDE.  
(980 m.; 2887 f.)

FIG. 2.



*Frías.*

THE CONTINENTAL DIVIDE IN A DEPRESSION OF THE PLAIN BETWEEN THE SOURCES OF RIVER FRÍAS  
AND OF APPELEG STREAM.

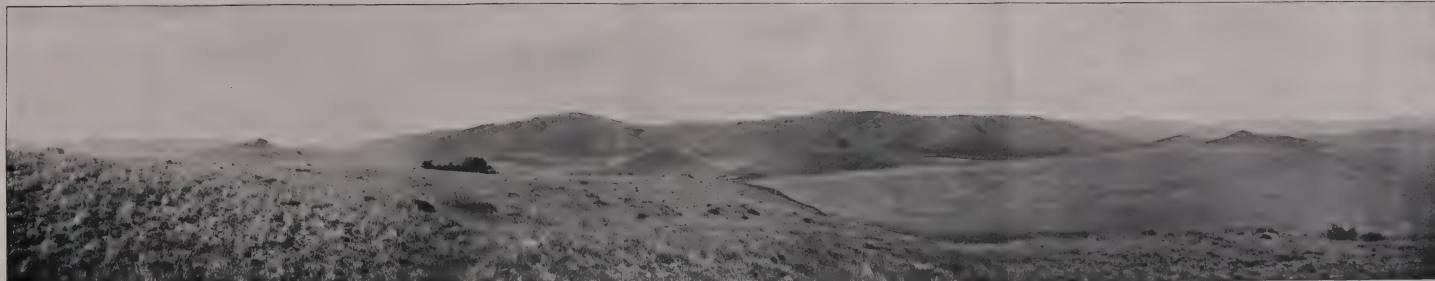
*Appleg.*  
[Face p. 907.]



*Appeleg Hill*  
(1214 m.; 3983 f.).

*Las Perdices Stream.*

*Pre-Cordillera.*



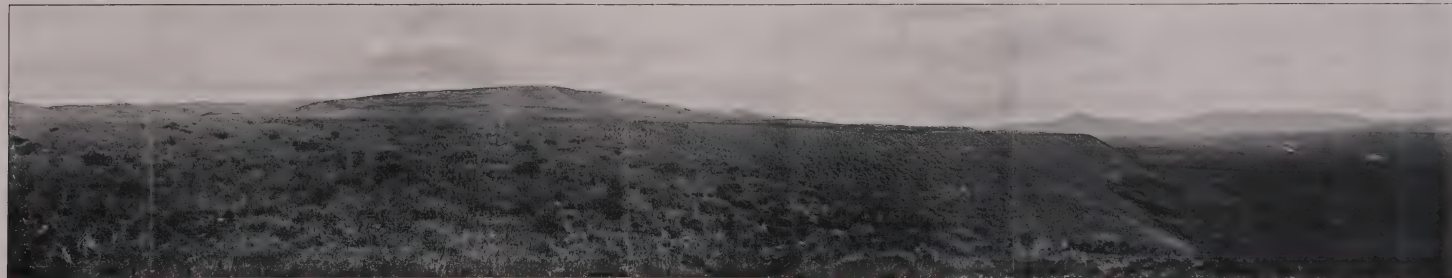
*Tributary to the Appeleg.*

*Continental Divide*  
(880 m.; 2887 f.).

*Valley of the River Frías.*

THE CONTINENTAL DIVIDE BETWEEN TRIBUTARIES OF THE APPELEG STREAM AND OF THE RIVER FRÍAS.

FIG. 2



*Terrace to S.W.*

*Cúceres Hill* (1510 m.; 4954 f.).

*W.*

THE GREAT BEND OF RIVER FRÍAS, TO THE WEST.





*Appoley Hills.*

*Pre-Cordillera.*

FIG. 1.



E

S.E.

S.

S.W.

THE CONTINENTAL DIVIDE FROM THE TERRACE WEST OF RIVER FRÍAS.

FIG. 2.

*Onko Hills.*



W.

VALLEY OF RIVER FRÍAS FROM THE SOUTH.

*Continental Divide*  
(880 m.; 2887 f.).

*River Frías.*

[Place p. 887.]



1070, 1161 metres (3445, 3373, 3511, 3809 feet), and terminates at Loma Baguales, 1307 metres (4288 feet), in the rising ground isolated by erosion, the slopes of which supply the tributaries of the rivers Pico, Omkel, Appeleg and Frías; to the south-east is Cáceres Hill, 1510 metres (4954 feet) high.

Any change in the amount of the rainfall modifies the region which contains, in glacial plains, that continental *divortium aquarum*, so much thought of by the Chilian Expert and Representative. The river Frías, after having gathered almost all the waters of the bed of the post-glacial lake, now dry, receives some tributaries from the south,—which rise in the Cumbre Negra, 1912 metres (6273 feet), a cretaceous block, belonging to the Pre-Cordillera,—and then flows gradually to the west until it meets with the river Cisnes, which cuts the main chain of the Cordillera through a narrow gorge.

It is well to repeat what has been said with regard to the surroundings of Lake Lacar, and to the longitudinal depression south of Nahuel-Huapi, as far as Lake Paz.

*All the mounds and terraces which exist in the eastern slope of the Cordillera, and in the regions to the east (and in some parts it is easy to recognise ten of them), are inclined to the east: that is to say, in a contrary direction to the course of the streams flowing to the Pacific from the same region.*

*All the canyons and gorges of the main chain of the Andes, through which these waters pass, are of very recent date. The erosion has not had time to enlarge them, whilst the broad ancient outlets are on the east, which denotes that the immense series of lakes emptied themselves in this direction.*

*The water-gaps are post-glacial, and the theory that many rivers have been older than the mountains they cross, which is correct elsewhere, is not applicable here. Nevertheless there can be no doubt that the gradual uplift of the Patagonian plain, which is still in progress, has contributed to stop the issue of some of these streams, and to modify its drainage.*

The tableland shaped mountains, which Dr. Steffen says he saw when ascending the river Cisnes, from a snow-capped peak of 1400 metres high (4593 feet), is the head of the Patagonian plateau, peculiar to the pre-Andean regions, and the "low hills, and open ground" of "the incorrectly styled Patagonian Pampa" are the undulations of the continental *divortium aquarum* which later on he crossed from south to north.

The Cordillera de los Andes rises to the west of this plain as can be easily demonstrated. Where the river Pico, to the west of the lake of this name, flows

into the Cordillera, the orography of the country changes, to the plains succeed hills increasing in altitude to the west until they may be properly termed mountains. Plate CIII., Fig. 1, a photograph from one of the little lakes situated near the first foothills of the Cordillera, shows to the north-west the high tableland which separates the Pico basin from the Carrenleufu basin, and to the north, Mount Desnudo, 2280 metres (7481 feet) high, situated among other peaks to the south of Lake Paz ; to the west and south-west are to be found Mount Cono, 1765 metres (5790 feet), Mount Dentista, 2070 metres (6792 feet), snow-capped mountains which command the transversal gorge through which the river Pico flows to Lake Roselot, at the western slope of the Cordillera. To the south of this mount continues the snowy chain which constitutes the main chain of the Andes. Plate CIV., Fig. 1, shows the details of the ground surrounding the mentioned little lakes, and situated entirely at the eastern slope, and shows the character of the region from the general tableland to the first eastern spurs of the Andes. The rocks are sculptured by ice, and with its detritus the moraines and other glacial deposits have been formed in the plains outside the Cordillera. Plate CIII., Fig. 2, comprises a more extensive landscape, and one of even greater importance ; several little glacial lakes are seen at the foot of the hills, and from the tableland on the north to Loma Baguales on the south, the scenery cannot be more impressive ; as it shows the eastern slope of the range the ground rises gradually up to the snow-capped mountains, and contains many deep valleys, through which the waters once flowed to the main river which cut the main range ; the eroded and undulating plain is entirely situated to the west of the continental divide, and the Cordillera rises still further to the west of it. Plate CIV., Fig. 2, is a view taken from a point situated at an altitude of 1540 metres (5053 feet), near the summit of Mount Botella, the height of which is 1570 metres (5151 feet) ; it represents a typical Andean scenery, and shows a number of snowy peaks increasing in height towards the west as they approach the main chain. Plate CV., Fig. 1, is a photograph taken at an altitude of 1930 metres (6332 feet), to the north-west of Botella Hill and is even more suggestive ; the main chain of the Andes culminating in Mount Puntiaigudo, is clearly seen near where the deep gorge of the river Pico intersects the range ; and Fig. 2 of the same Plate shows the river Pico cutting through the range, and Lake Sexto, situated at the eastern slope. The photograph inserted herewith represents Mount Pan de Azúcar, at a height of 2000 metres (6562 feet) in the line of high, snowy peaks ; and Plate CVI. shows Mounts Cacique, Blanco, Pan de Azúcar and Magdalena running to the south ;



Mount Dentista (2070 m.; 6792 f.). Mount Deseado (2280 m.; 7481 f.). Mount Cero (1765 m.; 5790 f.).

Table-land South-East of Lake Paz. River Pampas.

FIG. 1.



West.

North.

River Pico.

East.

THE EASTERN SPURS OF THE CORDILLERA FROM THE LONGITUDINAL DEPRESSION TO THE WEST OF THE CONTINENTAL DIVIDE.

Mount Deseado.

Mountains to the S. of Lake Paz.

The Eastern Table-land. FIG. 2



Lake Ah.

PANORAMA FROM THE EASTERN LONGITUDINAL DEPRESSION (VALLEY OF RIVER PICO). THE EASTERN SPURS AND THE FIRST RIDGES OF THE CORDILLERA DE LOS ANDES.



*Valley of River Pico.*      *Mount Botella*  
(1870 m.; 5151 f.).      *Mount Cono*      *Mount Denuedo*  
(1765 m.; 5790 f.).      (2280 m.; 7481 f.).

FIG. 1.



THE EASTERN SPURS OF THE CORDILLERA, FROM LAKE No. 4 TO THE NORTH-WEST.

*Mount Dentista.*

*The Main Chain.*

*Mount Punta Negra*  
(2040 m.; 6693 f.).

*Mount Denuedo*  
(2280 m.; 7481 f.).

FIG. 2.

*Mount Cono*  
(1765 m.; 5790 f.).



W.

THE EASTERN RIDGE OF THE CORDILLERA DE LOS ANDES FROM NEAR THE SUMMIT OF MOUNT BOTELLA.

N.

[Face p. 870.]

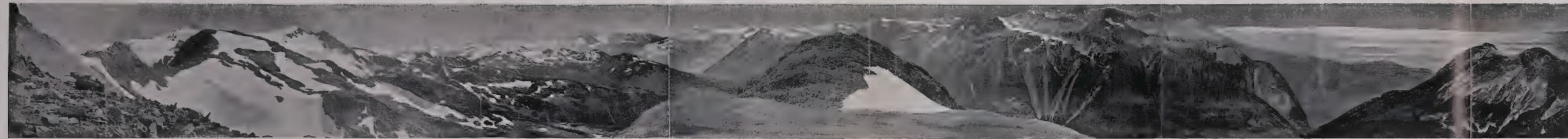




Mount Dentado.

The Main Chain.

FIG. 1.



W.

N.

E.

PANORAMA OF THE CORDILLERA FROM A SUMMIT OF 1930 METRES (6332 FEET) TO THE N.W. OF MOUNT BOTELLA.

Lake Ch.

Mount, 1750 metres (5742 f.).

Outlet of Lake Ch.

Mount Dentado  
(2070 m.; 6792 f.).

FIG. 2.



RIVER PICO, PENETRATING THE FIRST RIDGES OF THE CORDILLERA DE LOS ANDES (TO THE WEST).

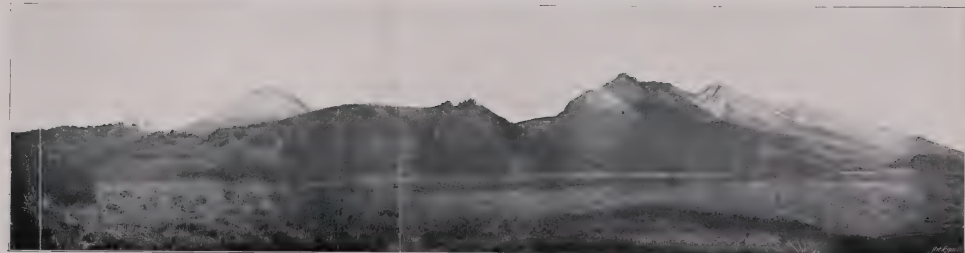
Plate p. 170



*Mount Magdalena*  
(2010 m.; 6595 f.).

*Mount Azúcar*  
(2000 m.; 6562 f.).

*Mount Cacique Blanco*  
(2100 m.; 6890 f.).



E.N.E.  
MOUNTS CACIQUE BLANCO, AZÚCAR AND MAGDALENA IN THE EASTERN RIDGE OF THE CORDILLERA (FROM THE EASTERN PLAINS).

[Face p. 870.]





to the west of them the Argentine boundary line crosses amongst high peaks and glaciers of the main chain.

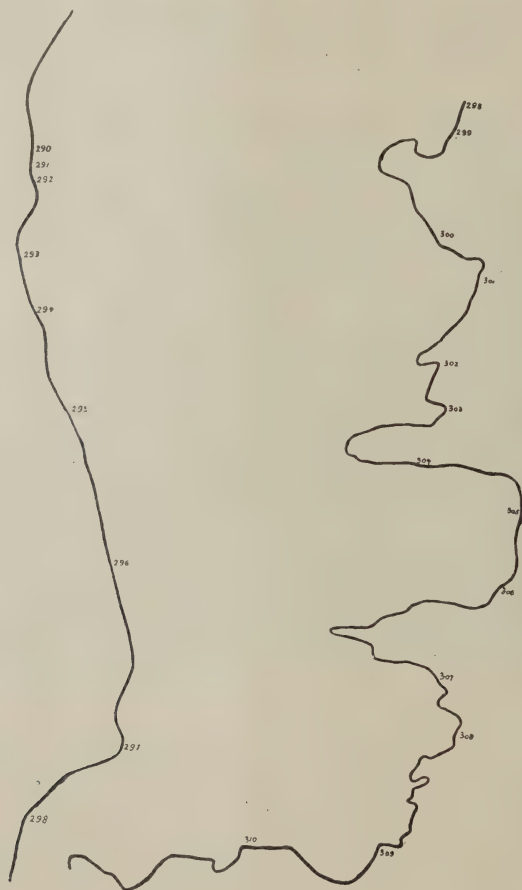
Plates CIII. to CVI. represent the Cordillera de los Andes, with its peaks rising up to 3500 metres (11,483 feet), while Plates LXXXIX. to CII. show the plain to the east, near the low ridges in the western part of the plain, and occasionally, to the south, the Pre-Cordillera. In the former region are located numbers 296 and 297 of the Argentine line, and on the latter are placed numbers 301 to 310 of the Chilian line. Which of the two agree with the conditions of



MOUNT PAÑ DE AZÚCAR FROM THE SOUTH (RIVER FRÍAS.)

the boundary line as decided upon? It is unnecessary to answer, as the photographs speak for themselves. An examination of Maps V. and VI. will show that the Chilian line, as there laid down, is far from being, as it is stated to be by the Chilian Expert, the more uniform in direction, and it would indeed be difficult to draw a boundary line more tortuous than the one he desires to adopt. The Agreements order that the line must run from north to south, but the Chilian line, at this region, zigzags from east to west, embracing in its windings many Argentine

settlements, and homes of colonists who, knowing that the boundary between both countries is the crest of the Cordillera de los Andes, have rightly considered that the Argentine Republic is lawfully entitled to these regions. The diagram inserted herewith makes graphically apparent the correctness of the preceding considerations.



THE ARGENTINE LINE IN THE  
MAIN CHAIN OF THE ANDES.  
(Landmarks Nos. 290 to 298.)

THE CHILIAN LINE IN  
THE CONTINENTAL DIVIDE.  
(Landmarks 298 to 310.)

It should also be added that, in the small valleys of the general plains, waters although rising in the same spring or lake, run afterwards in opposite directions, which is entirely opposed to the interpretation of the Chilian Expert of the expression "main chain" as "an uninterrupted series of crests, which divide the waters," and which he calls "the hydrographic Cordillera."

## CHAPTER XXV.

- Summary*—1. THE REGION OF LAKES FONTANA AND LA PLATA.  
2. THE REGION OF THE RIVER AISEN. CHILIAN EXPLORATIONS.  
3. GENERAL CONFIGURATION OF THE GROUND.  
4. THE ARGENTINE AND THE CHILIAN BOUNDARY LINES.

## 1. THE REGION OF LAKES FONTANA AND LA PLATA.

SOUTH of the gorge where the river Cisnes or Frías cuts through the Cordillera, the two boundary lines approximate, and may coincide along a short stretch. In the regions described in the preceding chapters, the *continental divide* occurs to the east of the Cordillera, far outside it ; but to the west of Lake La Plata that divide regains the Cordillera. The Chilian Expert has been unable to avoid the consequences to which his preconceived doctrine led him, and therefore his proposed line makes a great bend from the low plain to the snowy peaks, following a west to east trend for about a degree of longitude, against the text of the Treaties and against the orographical facts. The diagram on page 872 makes this perfectly clear and needs no comment.

The Argentine line, after crossing the narrows of the Cisnes river, passes directly to the south along the summit of the main chain, to the west of Lake La Plata, while the line of the Chilian Expert runs from east to west, following,—in what he calls “nameless Cordillera (No. 310),”—the water-parting between lakes La Plata and Fontana, and the river Frías, until it approaches the Argentine line in a point which has not been numbered, but which may be on Mount La Torre (No. 298 in the Argentine line), or very near it. The Chilian Boundary Commission map does not contain many details concerning this region, but those of the Argentine Boundary Commission afford more information, as their surveyors have explored that region and ascertained some important facts in connection with it.

It has already been stated that Dr. Steffen, when reconnoitring the river Cisnes, found to the south of it a stream that drained a small lake, situated



among high snow-capped mountains to the east, from which descended another stream that fed it; in the map accompanying his account there are shown two streams, both of which rise in small lakes and form southern tributaries of this river; Señor Moreteau, surveyor of the Argentine Boundary Commission, has lately succeeded in verifying the sources of the three streams, when examining the mountains to the north and west of Lake La Plata. The eastern one rises in the depression existing between the Pre-Cordillera and the outer spurs of the Cordillera.

To the west of this depression, gneiss and granite form the preponderant rocks in the Cordillera, which rise gradually in height, exhibiting upon its slopes deeply eroded valleys some of which are partially filled with glacial material. Snow and ice, combined with almost perpetual rain, have denuded the rocks, while a great number of little rivelets cutting their way to the south and east, are gradually approaching the depression where lie lakes La Plata and Fontana, and it is very probable that the erosive agents at work will, in a relatively short time, produce another change in the continental divide. Plate CVII., Fig. 1, taken from a summit at 1695 metres (5561 feet) above the sea, shows the Cordillera from north-east to west, the transversal depression where the river Cisnes now runs, and the small oblique valleys through which flow the tributaries of this river. Mounts Áspero or Gallo, La Torre, Alto Nevado and Goode are visible in the plate, as well as the high snowy peaks and glaciers which form the main chain of the Cordillera, along the crest of which the proposed Argentine line runs; the broken rocks and glacial accumulations in the foreground sufficiently demonstrate the rapid destruction of the slopes of the Cordillera, and therefore the change in the details of drainage and the difficulty of permanently fixing artificial boundary marks. Such a difficulty does not exist when the boundary follows a line of peaks, since they do not change their positions, besides being visible and unmistakable.

From the heights of the eastern slope towards the Patagonian plains, is to be seen the landscape represented in Plate CVIII., showing the distant hillocks near Lake Fontana increasing in height as they pass to the west, the emerged mesozoic ridge which separates that lake from Lake La Plata, and the hills gradually changing into mountains and exhibiting the glaciers to the west of this last lake. Further to the west is situated the north-western and western part of the "continental divide," and to the south is visible in the plate a depression which is a continuation of the one where the south-eastern tributaries of

the river Frías flow, and which forms the separation between the Pre-Cordillera and the Cordillera. In this depression the waters running to the northern branch of the river Aisen,—which flows into the Pacific,—take their rise, while the two mentioned lakes drain to the Atlantic. Thus to the north, to the west and to the south of those lakes, the “continental divide” occurs either outside the Cordillera altogether or on its eastern slope. Plate CVII., Fig. 2, shows the range of the Cordillera running south of Lake La Plata, and the eastern end of the deep valley and gorge of the northern arm of the river Aisen, which was ascended by Dr. Steffen in 1896, as far as the neighbourhood of the point where the photograph was taken. The southern depression previously referred to extends half-way across Lake La Plata, and marks a geological change which determines, as has been said, the difference between the Cordillera and the Pre-Cordillera. These lateral ridges on both sides of the lake are composed of sedimentary rocks, cretaceous and jurassic, while the chain of the Cordillera is chiefly composed of old rocks, gneiss and granite.

The cartographical documents produced by the Chilian explorers who have surveyed the upper basin of the river Aisen up to 1898 are very meagre as regards information. The most complete known to the Argentine Boundary Commission is the document sent by the Chilian Expert to the Argentine Expert in 1897, reproduced in Plate XVII., and it is difficult, with this document, to establish with any degree of certainty which of the streams indicated forms the northern tributary of the river Mañihuales, visited and crossed by Dr. Steffen. It may be the one which takes its rise in the above-mentioned depression, or it is probably the other furthest to the east which he left behind him when travelling in that direction.

In this depression, at a turf-bog and in a marshy plain, at an approximate height of 100 metres (328 feet) above Lake La Plata, are situated the sources of the stream mentioned, together with those of a second stream running in an opposite direction, and emptying itself into Lake La Plata. Further to the west, about four miles from the west end of the lake, the continental divide again occurs in another swampy plain at an altitude of only 40 metres (131 feet) above the normal level of the lake. The gradient of the slope down which the waters flow to the lake is comparatively slight, while that of the stream running down to the river Mañihuales is very great, and consequently the waters rush in a regular torrent. The glacial terrace, forming the marshy plain, facilitates the continuous erosion, and it is not rash to state that within a comparatively short

*Mount Alto Nevado.*

*Mount La Torre.*

*Valley of River Frías or Cisnes.*

*Mount Gallo or Águila.*

*Valley of River Frías.*

FIG. 1



THE CORDILLERA DE LOS ANDES FROM NORTH-EAST TO WEST, SHOWING THE TRANSVERSAL DEPRESSION OF RIVER FRÍAS OR CISNES.  
(From Mount marked 1695 Metres in the Map.)

*Eastern Ridge of the Cordillera.*

*Lake La Plata.*

FIG. 2.



*Depression of River Matihuales.*

LAKE LA PLATA AND THE TRANSVERSAL DEPRESSION BETWEEN THE CORDILLERA AND THE PRE-CORDILLERA TO THE SOUTH OF THE LAKE.

[Face p. 675.]





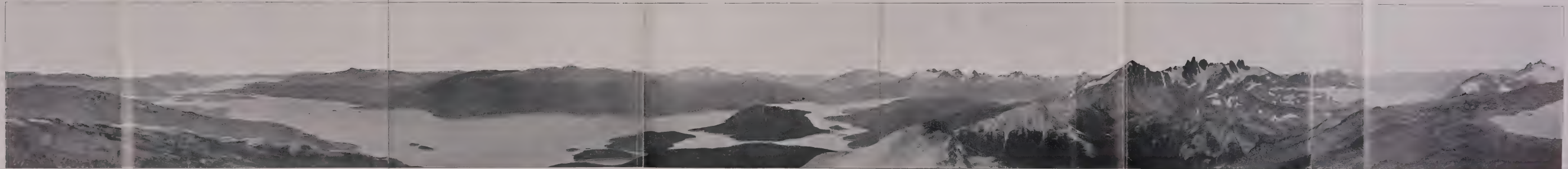
*Lake Fontana*  
(830 m.; 2723 f.).

*Mount Katterfeld*  
(1870 m.; 6135 f.).

*Lake La Plata*  
(340 m.; 1115 f.).

*Northern Arm of River Aisa or River Muñigales*  
(990 m.; 3248 f.).

*Mountains to the east of the Main Chain.*



East

LAKES FONTANA AND LA PLATA.

West

[Face p. 173]



period the torrent will cut a channel across the terrace thus reaching the lake. It is very probable that lake infiltrations already exist, in which case the waters must now run both to the Pacific and to the Atlantic.

At the north-west end of the lake there is a stream which discharges its waters into it; if this stream is followed, a small lake will be reached surrounded by marshes and glacial material, and fed by a rushing stream which descends from the north, having its sources in the immediate neighbourhood of some morainic deposits, from which also flows, descending to the north in the direction of the river Frías or Cisnes, another stream tributary of this river. As the river Frías cuts through the main chain and flows to the Pacific, in this morainic deposit another case of continental divide is produced.

Scarcely separated by a small dam of only a few metres in extent there is to the east of the above mentioned small lake another small one, the waters of which flow underground, forming the source of a large stream which rises to the west, and which probably joins the tributary of the Lake Las Torres, visited by Dr. Steffen. Both lakes, which undoubtedly communicate by infiltration, are 30 metres (98·4 feet) above the level of Lake La Plata, and as the western outlet is very steep with falls and cascades, there is no doubt that at a very near date it will finally wear away what forms the present apparent separation, composed of loose glacial material and turf-bog. When this occurs either through the depression to the south or to the north-west, the waters of Lake La Plata will empty themselves gradually into the Pacific.

Lake La Plata is situated at 940 metres (3084 feet) above the sea, and Lake Fontana at 930 metres (3051 feet). If the filtrations to the west are converted into streams and if these should erode 50 metres (164 feet), the level of Lakes La Plata and Fontana will descend in such a manner that the river Senguerr will cease running to the east; the river Gato, which rises in the Pre-Cordillera to the north of the river Senguerr, continuing to send its waters to the latter, will flow westwards to Lake Fontana. The continental divide would thus be produced in the vicinity of Steinfeld farm, in the open plain formed by the bed of the great ancient lake through which the Senguerr now winds its way. The case would be completely similar to that of the river Fénix which will be described further on, which ran until very recent times to the east as a tributary of the eastern normal outlet of Lake Buenos Aires, thus sending its waters to the Atlantic, but which, when the river Las Heras received the waters of the lake, by a change in its outlet, turned to the west by the dry bed of the former course of the river.

Lakes La Plata and Fontana were once a fjord-like branch of the largest of the old Patagonian lakes which have since disappeared and of which Lake General Paz is also another vestige, just as Lakes Lacar, Lolog and Huechulafquen are remnants of the old Lake of Chimehuin, and just as Lakes Paz and Lacar have changed their drainage, so the waters of Lakes La Plata and Fontana are gradually changing their outlets and will eventually flow in an opposite direction. The change of divide would be a repetition of those of the south-western fjord of Nahuel-Huapi, of the valleys Cholila, Esguel, 16 de Octubre, Carrenleufu, the rivers Pico and Frías, and of the series to be mentioned more to the south of the river Aisen, in Lakes Buenos Aires, Pueyrredon Belgrano, river Mayer, Lake San Martin and in the depressions of Vizcachas and Gallegos. Notwithstanding these changes which are taking place in that continental divide which the Chilian Expert tries to convert into an international boundary, the watershed of the main chain of the Cordillera de los Andes will not alter its position and the *waters will always descend by its eastern and western slopes* between which the immovable boundary, according to the Treaties, must be traced.

## 2. THE REGION OF THE RIVER AISEN. CHILIAN EXPLORATIONS.

It has been said that lakes La Plata and Fontana are bounded to the south by hills that gradually increase in height from east to west until on their western slopes they again descend to a depression separating these hills, which constitute the Pre-Cordillera, from the true Cordillera de los Andes. A half of Lake La Plata is situated in the eastern slope of the Cordillera, the mountains of which are higher to the west of the lake.

The hills and mountains of the Pre-Cordillera culminate in Mount Katterfeld, 1870 metres (6135 feet) high, and they are continued eastward in a short ridge, with summits of 1482 metres (4862 feet), 1492 metres (4895 feet), 1632 metres (5354 feet), 1466 metres (4810 feet), 1096 metres (3596 feet), Cerro Guía, 1236 metres (4055 feet), and 960 metres (3150 feet) above the sea, which command the wide plain to the south of the river Senguerr. To the south, in the neighbourhood of Mount Katterfeld, there is a summit of 1735 metres (5692 feet), and at some miles to the south-east, another summit attains an altitude of 1365 metres (4478 feet). Between these two last elevations and those mentioned above, rises the Verde stream, a tributary of the river Senguerr, which winds its

way across wide meadows at an altitude of 700 metres (2297 feet) above the sea. This stream passes through a narrow gorge opened in the neo-volcanic rocks which run from the Senguerr to the south, attaining altitudes of 1296, 1238, 1189 and 1200 metres (4252, 4062, 3901 and 3937 feet), above the sea, the last being situated to the north of the hollow where the little rivulet Coyet rises. To the west and south-west of these hills there is a wide undulated plain watered by the Goichel, a stream which rises in the south-western slope of Mount Katterfeld, and running south, afterwards turns to the east at the base of the mount which has been indicated as being 1365 metres (4478 feet) high, and then gradually follows to the south-east, up to the plain of Coyet, south of the last neo-volcanic rock mentioned, i.e. that which is 1200 metres (3937 feet) high. It then turns to the south, continuing so for some miles, and afterwards to the west in the plain, 720 metres (2362 feet), where rise two hills, from 400 to 600 feet high above it; to the east there is only the vast depression of Coyet, which extends right to the Atlantic. The continental divide occurs in this plain, as the Goichel stream is the eastern tributary of the river Aisen.

It has been said that before the Argentine Republic and Chile arrived at a settlement on the Andean boundary, Chile pretended to incorporate within her jurisdiction the greater part, if not all, of Patagonia, and that in 1870 the Chilean Government arranged that an expedition starting from the Pacific coast should explore the river Aisen in search of a waterway through Patagonia (page 128). Captain Simpson, who was in charge of the expeditions made with that purpose in 1871 and 1872, after returning from his journeys informed the Government that during his explorations, "the Cordillera de los Andes had been crossed by water as far as its last gorge, thus proving that the river Aysen takes its rise in eastern Patagonia." Though this fact was not contradicted either before or during the discussions preceding the Treaty of 1881, its accuracy was afterwards held in doubt by the Chilean Geographers, but in 1896, once Dr. Moreno, during his journey to Lake Buenos Aires, had visited this region, the Chilean Expert resolved to make an enquiry organising an exploring party under the command of Dr. Steffen. In Dr. Steffen's preliminary report \* to the Chilean Government it is stated :—

P. 93.—"The Surveying Commission of the river Aisen, organised by a supreme decree of the Minister for Foreign Affairs of Chile, under date October 14, 1896, was to

\* Memoria de R.E. de Chile, Santiago, 1897.



comply with general Instructions set forth by the Chilian Expert for marking out the boundaries with the Argentine Republic, Don Diego Barros Arana. The essential points of the Instructions were the following:—‘A Surveying Commission is being organised, whose duty it is to undertake a journey for the survey of the river Aisen and the Andean region of Patagonia, in the neighbourhood of 45° S. lat.’ ‘The Commission will undertake the ascent of the river Aisen in sloops made for the purpose, making a sketch of the itinerary with the utmost possible exactness, and examining the valley as regards its physical geography, vegetation and zoology, its geological formation and conditions for colonisation and the opening up of roads.’ ‘In the upper parts of the river which cannot be navigated in boats, the river route shall be abandoned in order to continue the march by land, but always at more or less distance from the river, up to the region of its source.’ ‘A special study will be made in this part, over and above the points already indicated, of the orographic connection of the different ridges of the Cordillera, in order to be enabled to determine with certainty the extent and breadth of the Andean system, and to solve the question, hitherto undecided, as to whether the DIVORTIUM AQUARUM between the Aisen and the streams which contribute to form the Argentine river Senguerr, is situated outside of the extreme eastern spurs of the Cordillera.’ ‘As the principal arm of the river Senguerr takes its source in Lake Fontana, the topographical position, configuration and dimensions of which are indicated in many different ways upon the maps, the expedition shall continue its surveys, with the previous permission of the Argentine authorities, in the *divisory* region towards the north as far as the said lake, in order to rectify its location, and to explore its outlines and principal affluents.’ ‘In view of the impossibility of taking riding animals and beasts of burden to the valley of the Aisen from above, at the same time that they are *indispensable for a journey in the open Patagonian plains*, the expedition will have to confine itself to the above indicated operations, excepting in the case of meeting with a colony or establishment on the other side, where means of transport might be obtained for continuing the journey in the adjoining zone.’”

Dr. Steffen divided his expedition in two parties:—the first, under his personal command, kept to the main river as far as its junction with the northern branch, which was followed until the end of the journey, and which was called the river Mañihuales; the second, under the command of Señor Fischer, followed the central branch as far as its confluence with the river Coyaike, which was explored nearly up to its source, as he considered it the most important, not being aware of the extent of the main branch which runs from the south-east.

Like all the results of the last Chilian exploring expeditions, those attained by Señores Steffen and Fischer have been published in Spanish and German, and if they are studied with attention, it will be observed that in both versions, *it is stated that they crossed the entire breadth of the Cordillera de los Andes.*

Dr. Steffen in his Spanish quoted official report, speaks of the “rapids” \* of

\* See the figure inserted herewith representing the rapids of the Chilote.

the "cascades," of the "slips" of the "mountains," of the "steep ascents," of the "slopes apparently insuperable" when he travelled in the Cordillera, of having left the "high Cordillera to the west," of the "snow-covered masses formed by the latter," and of the "low denudated hills of the eastern region" which he reached at the end of his journey.

In his report, Dr. Steffen after saying that he travelled eighty-five miles by the river; adds :—

P. 104.—"In the afternoon of March 19, we crossed a wide rising ground, from the top of which we saw before us the valley of a river, the visible course of which was



RAPID OF THE CHILOTE (RIVER AISEN).

W.N.W. to E.S.E., losing itself behind some undulations of the ground. *We then assumed that we were in the continental water-parting, as by the configuration of the ground and the direction of the valley, it seemed impossible to us that this river could contribute still to the hydrographic system of the Aisen.* We committed, however, as we knew afterwards, a grave error, because the river that we crossed here near its source bends afterwards to the south, and making a very long curve, runs to the west to *penetrate into the heart of the Cordillera.* It was the river Nirevao, the same the valley of which we saw burning, and by the confluence of which with the river Mañihuales we had passed. When descending to its glen, we observed that only in some parts was it carrying running water, while presenting a very broad bed which denoted that it had before a great volume of water. Here we saw the first herd of guanacos and discovered tracks of horses that unhappily lost themselves in the gravelly ground. The dearth of water in the glen obliged us to deviate a little from



THE EASTERN RIDGE OF THE CORDILLERA FROM THE HILLS TO THE EAST OF THE RIVER MAÑIHUALES.

the eastern direction, and to look for the way nearest to the *wooded spurs of the Cordillera*, as only there could we hope to shoot huemules and to meet with some rivulets. Far to the east, a depression had been discovered, small, but well marked, between the high rising ground, and we walked to it, following an E.N.E. direction, ascending and descending alternately rising grounds and tablelands abounding in ostriches and guanacos. In that manner we walked a distance of nearly 12 kilometres (7.46 miles) in rapid and extremely tiring marches, increasing the weight of our burdens with the indispensable quantity of water that, for greater safety, we carried from one camp to another. At noon of the 21st, we reached the top of a rising ground about 1250 metres (4101 feet), at the foot of which we saw a wide glen with running water winding in an eastern direction, bounded by walls of sandy sedimentary rocks. We knew at that moment that we had crossed the inter-oceanic *divortium aquarum*, as the river which waters the glen was the *Arroyo Verde*, the southern affluent of the river Senguerr, an outlet of Lake Fontana. We continued by its course, for some 5 kilometres (3.11 miles), till a point was reached where the sides of the glen are some distance from the river, leaving it to run to the open pampa, which extends without limit to the far eastern horizon."

If instead of following this direction Dr. Steffen had kept to the horse tracks that he says he met with—which were those of the horses of the Argentine surveyors—he would have followed the bend of the Goichel stream, *and would have found himself in the midst of the plains, before reaching the*

*divortium aquarum*. Nevertheless, in this report Dr. Steffen cannot avoid saying that in the last days of his journey he travelled along the eastern spurs of the Cordillera, and that, in reaching the continental divide, he passed over rising grounds and tablelands, where guanacos and ostriches live, that is to say, in the undulating region which precedes the hills of the Pre-Cordillera, and in his German account of his exploration he confirms this opinion. After relating his journey along the north and south course of the river Mañihuales, leaving to the west the snowy Andes, he says \* :—

P. 464.—“Ten long days’ march were yet required to thoroughly measure the wood-covered sub-Andean region. One after another the heights, generally covered with *Fagus antarctica*, were traversed, which heights form the *eastern spurs of the snow-capped central Cordillera massif*, and in part limit the very full bodied tributaries of the Aisen. The latter all run first in a north and south direction, then bend towards the south-west, and unite in the valley of a great river, which disappears towards the west in the *main massif of the Cordilleras*, to unite with the northern arm of the Aisen in one of the afore-named ravine-shaped openings of the head valley. Great clouds of smoke rising from carelessly left wood fires, appeared out of the depths of these river valleys, announcing that here already *colonists from the Argentine side had advanced into the valley of the sources of the Aisen which were more easily accessible from the east*.

“After the expedition had reached the height of about 900 metres above the sea level, the *coligüe* thickets, which up to then had been the chief obstacle to our advance—ceased to appear, and the march continued with a general direction between east and south through open beech woods, which often even rendered the bush knives superfluous. The district connecting the forest region of the high Cordilleras and the wild Patagonian plateaus forms everywhere charming landscapes. Between softly curved mountain ridges extend wide flat valleys, in which clumps of woodland alternate with pampa-like wide plains or marshy meadows (*nadis*). Numerous little lakes lie concealed in the folds of the ground and send out their waters in furious currents towards the south into the above mentioned large river near the Aisen. Unfortunately the *pampa-like tablelands*, already clothed with the prickly *mulínun*, are rendered impassable by small rodents (the so-called *Tucutucos*) which undermine them, so that the march across them for the heavily laden carrier sinking at every step to his ankles, and sometimes falling down, would be a real martyrdom.

“At a distance of about 25 kilometres from the point where the Aisen was left behind the expedition reached the end of the united mountain forests. Further to the east extended high naked ridges, where only in a few deep glens, small spots of burnt wood were seen. The watercourses became fewer and were in parts lost in disconnected ponds, but remaining still as tributary to the river basin of the Aisen. On March 19, the first guanacos and horse tracks were noticed, but were soon lost in the stony

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\* Verhandlungen der Gesellschaft für Erdkunde zu Berlin, vol. 24, 1897.



tableland. The lack of water, ever increasing towards the east, obliged us now, as far as possible, to seek our way in a northerly direction, near the spur of the last wooded hill of the Cordillera; for here alone running water was to be had and an opportunity of hunting the huemul (Andean deer), the flesh of which formed for some weeks almost the sole nourishment of the expedition. Just in the region of the passage over the thin mountain woods this animal, so like our deer, has his favourite resort; in the open pampas it is seldom found, and in the moist primeval woods of the west coast only solitary specimens are found of the stronger stags, which are well able to sustain the combat with their chief enemy the *puma*.

"After a further march of 12 kilometres in the direction mentioned over waterless tablelands and naked ridges of mountains the interoceanic water-parting was reached. This lies here on the extreme flattening out of the sub-Andean high chain, and on account of the superimpending drainless tablelands is not always easy to find. The expedition crossed the line at a height of about 1250 metres above the sea level, and then descended towards the east into a low valley enclosed with sandstone cliffs, which, as shown later on, forms the source of the Cañadon del Arroyo Verde, a southern neighbour of the Argentine river Senguerr. We followed the valley down for 5 kilometres, to the point where the side walls fall back and the river flows away to the east over the quite flat boundless pampas which stretch out to the distant eastern horizon. But there its watercourse is soon again dried up and we could not venture, with the poor remains of our provisions, into the perfectly wild pampa region, inhabited only by ostriches and herds of guanacos, so the dried-up bed of the Arroyo Verde was abandoned and the march was diverted towards the E.N.E., through a broad low ground, which is divided from the open pampa by a high chain of tablelands (cerros de Campelchaque or Camputrac). A motionless lagoon in which large flocks of flamingoes bustled about, was passed, and on the evening of March 22, after a further 12 kilometres of tiresome walking, we reached the river Senguerr, the efflux of the large Lake Fontana."

Dr. Steffen thus states again that, after great privations, he passed to the east of the eastern spurs of the snow-capped central Cordillera massif, which is cut by the rivers, while coming from the east, Argentine colonists have reached this ground, which is easily accessible from that direction; he also says that he crossed pampa-like tableland on his way to the east towards the interoceanic water-parting, which is not easy to find owing to the surrounding waterless tableland, the divide not being very distinctly marked in comparison with the well-defined watershed of the central or main chain of the Andes; and he finishes by declaring that, having formed a decided opinion on the geographical position and orographical conditions of the zone forming the water-parting, he noted "the surprising fact that the Aisen with its branch-work of springs penetrates far into the eastern tableland of the sub-Andean ridges and PASSES THROUGH THE WHOLE BREADTH OF THE CORDILLERA in a valley system with many



branches," and that the assertion of Captain Simpson, concerning the going back of the water-parting into the open pampa country, holds good up "to a certain point." He adds :—

P. 473.—"The time allowed us and the means of the expedition were far from sufficient for an exploration of all the river courses which unite in the valley system of the Aisen. It has also been impossible therefore, to fix the exact boundary of the Aisen district towards the north and south. For that the labours of three or four Commissions would have been scarcely sufficient. In general, it may be established that towards the north the watershed between the Aisen and the two large lakes set deep into the Cordilleras. —Lakes Fontana and La Plata—of which the latter is as good as unknown—bends towards the west again in a very marked curve and is marked by high snow-bearing mountain chains, one of which provides the source of the river de los Mañihuales. To the south, it appears as if the chief arm followed by the second division of the expedition, and to which we gave the name of the river Simpson, possesses another remarkable development of its course over the most distant point reached by the expedition (in a southerly direction). Possibly it may force its way through in the neighbourhood of the non-outflowing Lake Buenos Aires. Our second division was obliged—in order not to lose themselves in a wholly uninhabitable pampa region, where no likelihood of meeting human beings existed—to give up the exploration of the river Simpson and turn into the valley of an eastern neighbouring river towards the east, and go further towards the north, so that here again gaps occur, which can be filled up at a later period."

The second exploring party, under the command of Señor Fischer, who was accompanied by the Swedish botanist Dr. Dusen, explored the central arm of the Aisen which flows from the E.S.E., and which was named on that occasion the Simpson, instead of the Coyaike, as it is known in Argentine maps. The explorers advanced to the east from the point where the river Mañihuales flows into the Aisen; passing many narrows and dangerous rapids they reached the confluence of the river Coyaike with the southern arm, and by the description of the journey, it is to be inferred that they left the Cordillera to the west, that to the east the ground is open, and that the more serious obstacles for the advance were the recent burrows. Señor Fischer says \* :—

P. 117.—"Crossing one of the pampas, about 2 kilometres long (1·24 miles), we arrived on the 17th (February) at noon, at a point where the main river turns towards the south and appears to continue in that direction for more than 20 kilometres."

From this point Señor Fischer continued the exploration of the eastern arm: on the 20th, after leaving Dr. Dusen, he followed the valley, and adds :—

\* Memoria del Ministerio de R.E., 1897, Santiago.

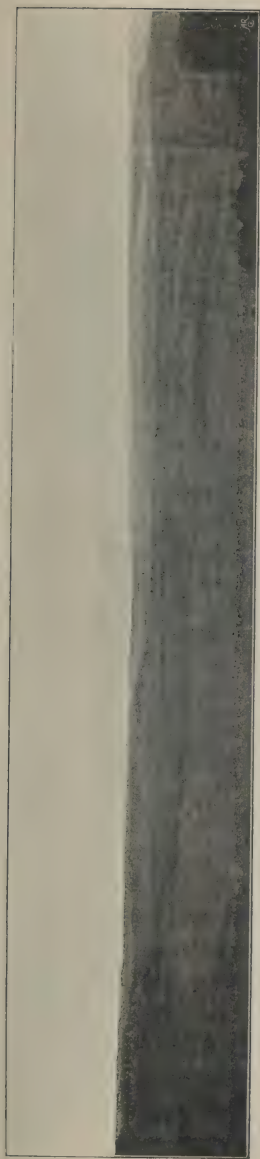
P. 117.—“On the 23rd we deviated from the stream which turns to the N.N.E. and commenced to scale the hills to the east. On the 24th we discerned at a distance open ground in an E.N.E. direction, and on the 26th before noon, we reached a small valley where only patches of wood were to be found. . . . We advanced on March 2 (in search of settlements) about 10 to 15 kilometres ( $6\frac{1}{4}$  to  $9\frac{1}{2}$  statute miles) a day, always along the same stream, which bears here the name of Coihaique, by extensive tablelands and rising grounds. The more serious obstacles which we had to overcome here were the heat, the *tucutucules* which are the burrows made by the *tucu-tucu*, a species of rat, and the last day, the lack of water. On March 4, we arrived at the source of the Coihaique at the breakfast hour. In the afternoon we crossed the dividing rising ground between this and the stream Ñirehuao, suffering a great deal from thirst. In the morning of the 5th we crossed the Ñirehuao stream, an affluent of the northern arm of the Aisen, and we continued to the due north. In the afternoon, when, owing to thirst, the men were nearly driven to desperation, we met with a stream, and better still, saw tracks of horses and wagons.”

Señor Fischer says that on March 6 he met two members of the Argentine Boundary Commission who gave him every kind of assistance, and then he states :—

P. 118.—“I moved the men and materials to the house of Señor Juan Richards, a Welsh colonist who lives with his brother Guillermo where the Ñirehuao stream enters the high Cordillera to meet the longer river.”

Though the surveying of the *divortium aquarum* was the object of Señor Fischer's expedition, no mention of it is to be found in his report, but the sketch by Dr. Dusen reproduced on page 551, shows the Cordillera de los Andes in its proper place to the west of the confluence of the different arms of the Aisen, and in the sketch of Dr. Steffen and Señor Fischer, reproduced on Plate XVII. (page 550), though the Cordillera is not marked, the mountains are represented to the west, and only plains to the east. Although in neither of the two sketches is to be found any indication of scale, it is possible to identify “Cerro Arqueado” of Dr. Dusen with “Cerro Mano Negra” of the Argentine map, showing thus that in this sketch the river Coyaike (or river de los Prados, as Dr. Dusen calls it) is depicted with a very short course.

Señor Fischer did not reach the continental divide, which occurs in a narrow valley excavated in the tableland, where, in the same swamp, rise a rivulet tributary to the Coyaike and one of the affluents of the river Mayo. Therefore, Dr. Steffen has made a mistake in saying that this divide is produced on the hills of the lateral ridge of the Cordillera. The way he took, through the hills and the tableland near Lake Fontana, impeded him from seeing the low plains



THE PLAIN OF THE CONTINENTAL DIVIDE TO THE SOUTH-EAST FROM MOUNT KATTERFELD.

opened to the east, where there is nothing that can be considered as the humblest of mountain ridges. The accompanying figure shows the landscape to the south-east of Mount Katterfeld, where the present water-parting line passes, but where no ridge at all is to be seen.

### 3. GENERAL CONFIGURATION OF THE GROUND.

The error of the Chilian Expert in maintaining that the main chain of the Andes is located to the east of the eastern sources of the river Aisen, is clearly shown on proceeding from north to south. To the south of Appeleg stream at the termination of the hills of that name, the traveller who arrives at the Senguerr river by this route, will have crossed an extensive plain generally barren in its centre, leaving to the west the hills of the Pre-Cordillera, and far to the east at some forty miles the volcanic hills which border upon the broken cretaceous tableland of the centre of Patagonia. This plain is the bed of the extensive dried up post-glacial lake to which reference has been made. The river Senguerr winds its way across it from west to east, and when in flood spreads over the flat land, where several Argentine farms exist. To the south of the river lie extensive low green plains, remnants of the old lake bed now abandoned by the waters : the meadows and swamps, 698 metres (2290 feet) and 705 metres (2313 feet), are watered by the Verde stream, and furnish pasture for a large quantity of cattle and sheep. The plain is bounded to the east and south by very

low terraced steps, and to the west are to be seen some rising grounds and low hills of volcanic origin, between which the stream has cut its channel. Further south of the pasture land the shingle plain recommences, gradually descending to the east, its waters draining into the small Lake Verde; to the south it scarcely slopes at all until reaching another low extensive plain crossing from the west. The figures inserted herewith show the edge of the shingle plain in its prominent part, 750 metres (2461 feet), and the low transversal plain as it is seen from Cantaush to the south-east, 650 metres (2133 feet) above the sea.



THE EDGE OF THE TABLELAND AT CANTAUSH.

If the traveller turns to the west he will meet, in these low plains, several lagoons,—some dry, while others contain but little water,—and several dry beds of streams and of large rivers. These lagoons are those of Coyet, the eastern one being at 635 metres (2083 feet) and the western at 670 metres (2198 feet) above the level of the sea. Some of the stream beds in winter and spring have the waters of the Coyet lagoons which they carry to the extensive eastern plains. Between Cantaush and Coyet the transversal hollow narrows in a place where, until very recent times, the waters of the large lost lake of Coyet were retained. Around the lagoons extensive meadows spread out, watered by the rivulets crossing from the slope of the tableland which borders the plain to the





*Southern Table-land.*

*Western Edge of the Southern Table-land.*

*Isolated Hills of the Pre-Cordillera.*

FIG. 1

*Lagoons of Coyel.*

THE PLAINS OF COYEL AND GOICHEL FROM A BASALTIC CRAG AT THE NORTHERN TABLE-LAND.

1120 m.; 3675 f.

*Northern Table-land.*

*Plain of Coyel.*

*South-eastern and Southern Table-land.*

FIG. 2



*Eastern Bend of River Goichel.*

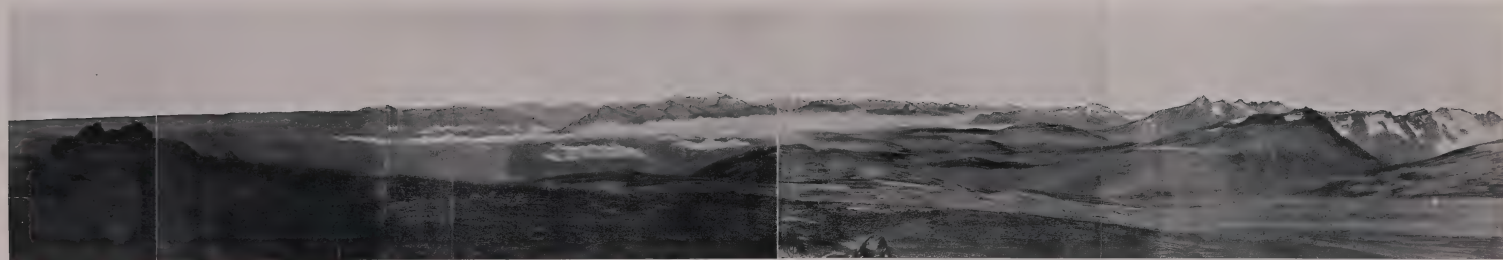
*S.W.*

(Face p. 698.)

THE BEND OF RIVER GOICHEL AND THE PLAINS OF COYEL FROM THE NORTH-WEST TO SOUTH-WEST, WHERE THE CHILIAN EXPERT LOCATES THE MAIN CHAIN OF THE ANDES (CHILIAN LANDMARK No. 314 AT THE CONTINENTAL DIVIDE).







THE FIRST RIDGE OF THE CORDILLERA IN THE UPPER AISEN REGION (FROM THE SOUTH-WEST OF MOUNT KATTERFELD).

[Face p. 883.]



south, while Lake Coyet is fed by a rivulet which, flowing from the west, rises at the foot of a basaltic hill, 1190 to 1200 metres (3904 to 3937 feet), above the level of the sea. Plate CX., Fig. 1. shows the panorama from the top of this hill, wherein it is easy to perceive that in the western horizon rise snowy mountains, but to the south and to the east there are only the general Patagonian tableland and the low transversal plain.

The south-eastern foot of these lavas runs from W.N.W. to E.S.E. whilst the Goichel stream turns sharply to the south.\* It has already been stated that



THE DEPRESSION OF COYET, SEEN FROM CANTAUSH.

this stream has its sources at the foot of Mount Katterfeld, running in a wide and more or less undulating plain, where meadows, glades and woods form a beautiful scenery and where the cattle and sheep of the Argentine settlements pasture. Plate CX. shows the landscape to the west: the high Cordillera commands it; in the foreground the extensive valley, in former times occupied by a lake, spreads itself out, and between it and the snowy ridges isolated hills are to be seen, more or less elevated as they approach the Cordillera; to the

\* Dr. Steffen has given the name of Nirehuao to the lower course of this stream.

east are only denuded parts of the fluvio-lacustrine terraces, between which and the Cordillera flows the northern arm of the river Mañihuales, the Goichel stream being its tributary. At the eastern part of the undulated broken valley, and at the foot of an isolated hill detached from the eastern tableland, 1200 metres (3937 feet) above the sea, are the settlements of Señor Richards to which Señor Fischer made reference. The western edge of this tableland is represented in Plate CXI., Fig. 1, which also shows the volcanic rocks that there elevate the tableland. The elevation increases gradually to the west, up to an isolated hill of 1634 metres (5361 feet). The volcanic mountain of Mano Negra, situated to the south-west of Señor Richards' house, rises above the plateau, in a gentle ascent from the east, but to the west it presents steep slopes, down which the waters flow in a stream emptying itself in the river Goichel. Mount Mano Negra towards the north commands this river, and towards the south the river Coyaíke, which descends from the east.

Between the rivers Goichel and Coyaíke extends a broken tableland where rise a large number of small rivulets, the northern of which flow to the Goichel and the southern to the Coyaíke. This tableland was crossed by Señor Fischer in the latter part of his journey.

To the east of the eastern bend of the river Goichel there exists, as already stated, another example of continental divide, and it has been shown that the valleys of Goichel and Coyet are formed by the bed of the disappeared lake. It has been also said that in the quoted sketch of Señores Steffen and Fischer there are no indications of anything like hills or hillocks in that region, and it is important to add that in the "Mapa de la Región Patagónica recorrida por las expediciones exploradoras de los rios Aisen y Cisnes (1896 to 1898)" there is the same absence of orographical features. If in Argentine maps the courses of the streams in the plain of Goichel are differently laid down, this difference is due to the change in the quantity of water in these streams at the time when the surveys were made.

It is impossible now to say at a glance where the "divortium aquarum" of the continent occurs in that region, although it is very probable that it runs across the morainic zone between Goichel and Coyet. It is not difficult to see that the streams cut their way further and further towards the east until they reached the district between Coyet and Cantaush, where the continual action of the western and north-western winds heaps up the sands which are already obstructing the passage of the waters between these points. These sands pro-



FIG. 1.



THE WESTERN EDGE OF THE TABLE-LAND BETWEEN RIVERS AISEN AND COYAIKEN.

FIG. 2.

*Table-land.*

*Eastern Ridge of the Cordillera.*

*Pre-Cordillera.*



*Valley of the Goichel to the West of the Eastern Bend.*

THE VALLEY OF RIVER GOICHEL, PRE-CORDILLERA, AND THE EASTERN RIDGE OF THE CORDILLERA, FROM RICHARDS' FARM.



ceed from a disintegration of the clefts of the neighbouring tableland, which is assisted in no small measure by the enormous number of rodents living in the proximity of the Cordillera. These animals riddle the ground on the slopes and valleys as well as on the tablelands : the dust they produce is carried off by the wind, and when the heavy rains come, little channels are opened in the loose ground, facilitating considerably the formation and the change in the courses of the small rivulets.

Plate CIX., Fig. 2, represents the region of the bend of the river Goichel from N.N.W. to S.S.E. by E., and is a clear confirmation of the Argentine Expert's assertion that the part of the Chilian boundary line which passes across that plain is outside the Cordillera de los Andes. Plate CXI., Fig. 2, shows the valley farther west viewed from Richards' settlement, to the N.N.E. and east, and exhibits the effects of erosion. In the northern hills the Goichel rises.

Ascending the tableland that to the south bounds the general transversal depression of Coyet, leaving some lagoons to the west, and reaching the top at a height of 1125 metres (3691 feet) above the sea, the traveller will meet with a deep canyon, opening to the north-west and narrowing to the south-east at the bottom of which runs the Ñirehuao stream, a tributary of the river Mayo, which flows to the Senguerr. The western springs of this stream are in the north-west edge of the tableland, which commands the Goichel valley, and at the foot of which, at an altitude of 725 metres (2378 feet) above the sea, runs the river Goichel which flows to the Pacific, the waters of both being very near and almost at the same level. To the south of the canyon, the tableland continues, showing some small volcanic hillocks, the highest reaching 1200 metres (3937 feet) above the sea. Glacial material is also to be seen together with the effect of erosion, which has excavated deep glens where rise tributaries of the Ñirehuao stream, and the eastern affluent of the river Coyaike. Afterwards the tableland descends to the south exhibiting numerous swamps, pools and small hills, the highest being 1075 metres (3527 feet) above the sea, at the western foot of which a swamp and a small lagoon give rise to waters flowing to the Coyaike and to others flowing to the river Mayo. From the tableland hundreds of miles spread out before the eye, and not a single prominence is met with, notwithstanding what the Chilian Expert and his assistants affirm. To the south, the gentle undulation is clearly indicated by patches of forest : to the east the terraced tableland disappears, lowering on the horizon : to the west is seen the longitudinal depression which precedes the first eastern

spurs of the Cordillera. The tableland is there cut by many narrow valleys or canyons often sculptured by ice-action, which are beds of branches of the large glaciers with their characteristic moraines perfectly well preserved, as they have suffered very little by erosion. Plate CXII. represents the valley of the river Mayo in which another example of the continental divide is produced, between the sources of the rivers Mayo and Coyaïke, in a moraine perfectly well preserved.

To the south of the river Coyaïke, between it and the south-western tributary of the river Mayo, are two little lakes, Castor and Pollux, tributaries of the southern arm of the river Aisen, and several other lagoons which at the present time have no outlets. To the south of the western tributaries of the river Mayo there is in the tableland an isolated volcanic hill, 1410 metres (4626 feet); from its slopes the waters flow to the Atlantic by the river Mayo; to the south and west its waters feed the southern arm of the river Aisen; this arm was erroneously called the river Huemules, before it was ascertained that it was not the eastern part of the true river Huemules which flows to the Pacific, to the south of the river Aisen.

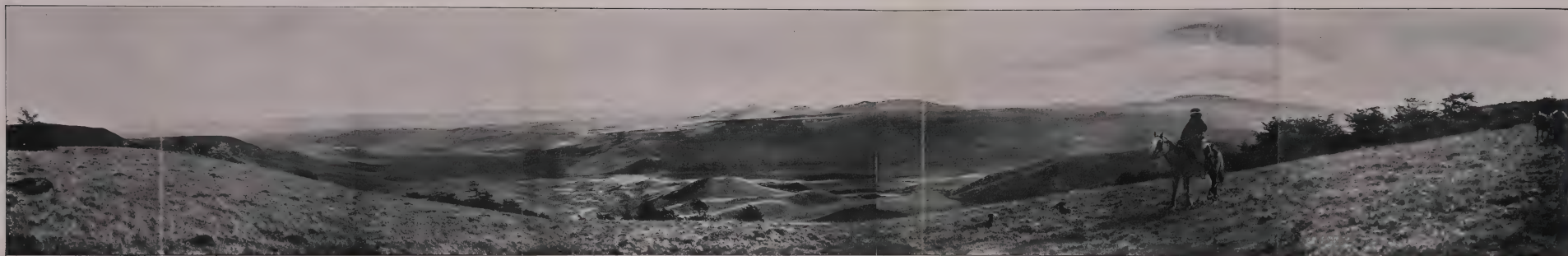
The eastern tableland is furrowed by the rivulets forming the Chalia stream, which runs to the east, receiving further on the waters, now considerably reduced, of the Laguna Blanca depression. This depression is the bed of the ancient eastern outlet of the large lake before it was drained off by the river Aisen, and by the present western outlet of Lake Elizalde. Laguna Blanca is the remaining eastern part of this lake. When in 1888 an exploring party, sent by the La Plata Museum, examined this region, this shallow lake had a permanent outlet, but the waters ceased afterwards to flow, and when the Argentine Expert, Dr. Moreno, visited the ground in 1896, only small brooks were seen, and this is still the case. This large lake was formerly occupied by a glacier, the rocky material carried by which is seen in the slopes of the tableland. When the glacier retired to the west, and the lake was cleared up, floating icebergs transported large boulders, some of which attain about 1000 cubic metres (35,000 cubic feet).\* The transversal valley replaced the lake, and in it are to-day to be found the eastern sources of the river Aisen, which rises in the slopes of the tableland, and in the eastern spurs of the Pre-Cordillera, which culminate in Mount Ap Ywan, 2315 metres (7598 feet). In the bottom of the valley, the

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\* Moreno, Notes Préliminaires, etc., Plates XXII. and XXIII., La Plata, 1897.

*South General Table-land.*

*The denuded Table-land.*



*North General Table-land.*

*Bottom Moraine.*

*North Table-land.*

THE CONTINENTAL DIVIDE AT THE VALLEY OF RIVER MAYO (SOURCES OF RIVERS MAYO AND COYAIKEN).





continental divide is produced amongst the boulder clay, as is clear from Plate CXIII., Figs. 1 and 2, which need no further description. In those spurs the morainic deposits appear in perfect preservation, as do also the successive shores of the former lake, the embankments indicating the gradual lowering of the waters in comparatively recent times, owing to erosion coming from the west and climatic changes. In this valley there are some Argentine settlements which communicate with Goichel and Senguerr and the other Argentine settlements by wagon roads.

The valley of Laguna Blanca, which reaches 525 metres (1722 feet) above the sea in the constantly changing "divide," is bounded to the south by the general tableland, which on the west has been uplifted up to the eastern slope of the first spurs of the Pre-Cordillera, attaining 1460 metres (4790 feet), and to the east spreads out with its characteristic steps.

It has been said that between the western edge of the tableland and the first spurs of the Pre-Cordillera, generally extends a secondary longitudinal depression, as far as the eastern foot of the mass of the Pre-Cordillera, which bounds the depression to the south. Mount Mano Negra, at an altitude of 1821 metres (5974 feet), rises in a ridge of an average height of 1500 metres (4921 feet); at its western foot passes the river Aisen, which receives the river Coyaike, and afterwards flows to the west through the Cordillera. This ridge, after being cut by the Aisen, continues to the west, increasing in altitude, and bounds the valley to the west. The river Aisen winds its way across this valley, receiving tributaries from the south and from the north, as well as the waters of Lakes Castor and Pollux. It appears that the Aisen has changed its course several times, and there is very fresh evidence of this change in the lower part, which in recent times was occupied by the waters of the dried up lake already mentioned. The former bed of the river at the time when it flowed to Lake Elizalde, which is the fjord-like western arm of the lost lake, is still to be seen perfectly well preserved. Plate CXIV. represents the valley between the tableland and the first eastern hills of the Pre-Cordillera.

Plate CXV., Figs. 1 and 2, are views of the valley in the Pre-Cordillera region, and show the first ridges of the Pre-Cordillera to the north-west and west, from a point situated three miles to the north-east of Lake Elizalde. The waters of Lake Elizalde, formerly tributaries to the Atlantic, have been captured by a river coming from the Pacific side, like those of Lake Lacar: Lake Elizalde is bounded to the north and west by hills, changing into mountains to the west.

while to the east there are only fluvio-lacustrine and glacial material, forming a swamp, in which exists the former bed of the Aisen. The Paloma streams carry to the lake the waters from the mountains of the Pre-Cordillera, the highest summit of which, Mount Paloma, attains 1979 metres (6493 feet). On the south-east Mount Colorado, at an altitude of 1693 metres (5555 feet), commands the large valley.

From observations recently made by Argentine surveyors it has been found that to the west of Lake Elizalde, the altitude of which above the sea is 253 metres (830 feet), there are at present large glaciers and narrow gorges through which its outlet passes towards the Pacific. This outlet is undoubtedly the river Huemules explored by Simpson, and, therefore, it cuts the Cordillera, as the lake is situated to the east of it, as are also the numerous lakes named before, extending south of Lake Huechu-Lafquen. The boundary line must then pass to the west of it, cutting the river where it intersects the main chain, and keeping the eastern part of that river, as well as the whole lake, under Argentine jurisdiction.

#### 4. THE ARGENTINE AND THE CHILIAN BOUNDARY LINES.

The Argentine boundary line, after cutting the river Cisnes, follows the main chain towards Mount La Torre (No. 298), continues along the line of intersection of the slopes upon that main chain, in the snow-capped ridge which bounds Lake La Plata on the west, and is prolonged to the south in the direction of Mount San Clemente (No. 299) also situated in the main chain, thus cutting the river Aisen (No. 300).<sup>\*</sup> To the north of San Valentin is the river Huemules, and this being the same as the outlet of Lake Elizalde, this river must be crossed by the boundary line, where the river cuts the main chain. The Argentine line agrees with the requirements of the Treaties, and passes along the watershed of the main chain of the Cordillera de los Andes. The figures inserted herewith, representing that Cordillera to the west of the river Mañihuales, and Plates CVII. and CVIII., justify this line.

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<sup>\*</sup> In the Record of September 3, it is stated that the line cuts the river Aisen, or Simpson, in the vicinity of its confluence with the rivers Mañihuales and Huemules, but in the new Argentine maps this name disappears in order to avoid confusion, and in its place has been given to it the name of Aisen, being the larger arm of that river.

*Table-land.*

FIG. 1.



S.W.

Laguna Blanca.

N.W.

N.

N.E.

THE DEPRESSION OF LAGUNA BLANCA (CONTINENTAL DIVIDE).

FIG. 2.



W.

VALLEY OF THE UPPER AISEN IN THE DEPRESSION OF LAGUNA BLANCA.

E.

[Place p. 808.]







PANORAMA OF THE VALLEY OF RIVER AISEN, WESTERN REGION, FROM A POINT N.W. OF LAKE ELIZALDE.

*River Aisen.*

[Plate p. 893.]



*Lake Elizalde.*

*River Aisen leading to the North.*

FIG. 1.



VALLEY OF THE SOUTHERN BRANCH OF UPPER AISEN TO THE WEST OF THE CONTINENTAL DIVIDE AND TO THE EAST OF LAKE ELIZALDE.

*Mount Huesbler.*

FIG. 2.



*River Aisen.*

W.

HILLS TO THE WEST OF THE VALLEY OF UPPER AISEN.

N.W.

[Face p. 803.]



Let us now examine the Chilean line, that is to say the continental divide. This line, according to the Record of August 29, is thus described :—

“The points called ‘nameless Cordillera,’ 311, ‘peak Katterfeld,’ 312, ‘accessible stretch,’ 313, ‘bend of the Nirehuao,’ 314, and ‘swamp of Coihaique,’ 315, separate the hydrographic basin of the Chilean river Aisen from that of the Argentine river Mayo (Senguerr). The ‘nameless point,’ *western edge of the high tableland (meseta)* marked with number 316, ‘accessible stretch,’ 317, and ‘unnamed point,’ 318, separate the hydrographic basin of the Chilean river Huemules, probably a tributary of the river Aisen, from that of the Argentine river Mayo (Senguerr).”

The Chilean data for tracing this line were very limited, as *Señores Steffen, Fischer and Dusen* did not examine a single one of the eastern sources of the rivers mentioned by the Chilean Expert, nor did Señor Bertrand, neither did the official Chilean Sub-Commission in charge of that section according to the Record of May 1, 1897, approach them (see Plate XXII.); and this want of information may have helped to mislead the Chilean Expert and to induce him to sustain an absurdity, in saying that his line follows *at that part, as everywhere else, the main chain of the Andes.*

The Chilean Expert, who, as a geographer, has so well defined the words “Cordillera” and “mountain,” could not, had he known the ground represented in figures, pages 887, 888, 889, and in Plates CIX. and CXI. to CXV., have applied to it the interpretation he gives to the term “main chain of the Andes,” when he states that by such, “he understands *the uninterrupted line of crests* which divide the waters, and which form the separation of the basins or hydrographic regions, which are tributaries to the Atlantic on the east and to the Pacific on the west, thus determining the limit between the two countries according to the principles of geography, the boundary Treaty, and the opinion of the most distinguished geographers of both countries.”



THE CORDILLERA DE LOS ANDES TO THE WEST OF THE RIVER MAÑIHUALES.



A rapid examination of the ground on which the water-parting south of the river Senguerr is produced, will show that its predominant features are opposed to the statements of the Chilian Expert and the Chilian Representative, and that the present abnormal basin of the river Aisen is not bounded to the east, as they affirm, by any mountain ridge at all.

Starting from the summit of Mount Katterfeld (No. 312 of the Chilian line), situated in the Pre-Cordillera, the water-parting between the "hydrographic basin of the Chilian river Aisen and that of the Argentine river Mayo (Senguerr)," as is stated in the Chilian Expert's proposition, occurs in the slopes of this mountain, leaving to the east a short ridge—with summits of 1492, 1632 and 1466

metres (4895, 5354, and 4910 feet)—which is cut by the Verde stream, a tributary of the Senguerr, and which continues to the south-east in two isolated hills of 1296 and 1200 metres (4252 and 3937 feet) high, above the sea. These hills slope gradually to the plains of the west, and more abruptly to the south-west, exhibiting walls of basaltic lava. They are classified as "accessible stretch" (No. 313 in the Chilian line), and in them terminates the so-called crest of what the Chilian Expert states is the main chain. To the south extend, transversally, the plains of Goichel and Coyet, in which it is impossible to



THE CORDILLERA DE LOS ANDES TO THE  
WEST OF THE RIVER MAÑIHUALES.

locate the divide owing to the frequent changes due to climatic influence. The region is so truly a plain that the Chilian Expert, in spite of his attempt to convert it into the main chain of the Andes, and of his assertion that the boundary line must be located in the summit of that particular chain, *has not found there the slightest elevation wherein to locate his landmark No. 314, and has consequently been obliged to choose as the summit of the Andes the "bend of the Ñirehuao," i.e. the bend of the Goichel stream.* "The dividing line of the waters of the South American continent" gently ascends, to the south of the depression of Goichel-Coyet, or Aisen-Senguerr, the northern slope of the western edge of the general

Patagonian tableland, to a height of 1120 metres (3675 feet) above the sea, and descends to the west to pass between the bend of the Goichel stream—which there, changing its north and south course, turns sharply to the W.N.W.—and the western part of the Ñirehuao, tributary to the river Mayo, which rises in the northern slope of the same general tableland, as previously stated.

At the present time the bend of the Goichel is rapidly wearing away the fluvio-glacial accumulation which exists between the two watercourses, and at an early period a new change of the divide will be produced. This to-day ascends to the west by a small glen to the tableland, reaching the edge at 1200 metres (3937 feet), where it turns to the south and descends to a small gorge, at 803 metres (2723 feet), where the Chilean Expert has located his landmark 315, as here is to be found another divide, which is also “continental,” the waters to the west running to the river Coyaike, and those to the east to the river Mayo. There also the divide will undergo a change before long, and the respective sources are already very close together. Continuing for a short distance to run by the tableland at an altitude of 1075 metres (3527 feet), 1020 metres (3347 feet), and descending to another small valley, 730 metres (2395 feet), the Chilean line turns to the north-west near the bend of the river Coyaike, 680 metres (2231 feet), then runs by the edge of the tableland, 900 metres (2953 feet), and afterwards, taking an irregular course, arrives at a low swamp, 725 metres (2379 feet), where it is impossible to fix the divide, as the waters run sometimes to the Atlantic and at others to the Pacific, according to the direction of the wind. As the Chilean Expert maintains that the crest of the main chain of the Andes is situated in the line dividing the waters of the South American continent, it follows that this main chain lies, according to him, in “*the swamp of Coihaique* (315).” It is impossible to conceive a greater error.

The Chilean line then ascends, turning again to the west, to the tableland.



THE CORDILLERA DE LOS ANDES TO THE  
WEST OF THE RIVER MAÑIHUALES.

900 metres (2953 feet), it then changes abruptly to the south-east, and afterwards, over undulating ground, to the south-west, near the two lakes Castor and Pollux, leaving to the east some lagoons without outlet; it returns to the south-east as far as a volcanic eminence on the tableland, 1390 metres (4560 feet), and, taking an eastern direction by these rocks, it descends towards the south-east, by the eastern slope of the tableland, to the valley of the ancient outlet of the former eastern lake, in the transversal depression of the Aisen and Laguna Blanca, 545 metres (1788 feet), where the divide is undefined, since the waters there flow towards both sides.

This divide ascends to the south along the western bank of the Indio stream,



THE CORDILLERA DE LOS ANDES TO THE  
WEST OF THE RIVER MAÑIHUALES.

and along the northern slope of the Guenguel tableland, leaving to the west the Argentine settlement of Los Halcones. The Indio stream, which flows across pasture land and glacial accumulation, changed its course several times before it flowed towards the west to the swamps forming the eastern sources of the Aisen. The waters run by a very gradual incline from the tableland, and meet on the northern side a narrow glen, which spreads out towards the Indio stream and to a tributary of the Aisen river, which during the rainy season flows both to the Atlantic and to the Pacific.

The Chilian Expert has said that there is no line more consistent than that of a divide, but the cases quoted here prove that in this he is greatly mistaken. The tableland rises to the slopes of the Pre-Cordillera, and the divide reaches a height of 1460 metres (4790 feet) at the foot of the eastern spurs of that mass, having to the east the tableland in which, to the south, the sources feeding the river Guenguel, a tributary of the Mayo and Senguerr, are quite close to the sources of the river Fénix, which until 1897 was an abnormal tributary to the Pacific, by Lake Buenos Aires and river Las Heras; but this continental divide has to-day disappeared, as the river Fénix has returned to its proper course towards the Atlantic by the river Deseado.

The Chilean Expert has described his line south of the "swamp of Coihaique, 315" as "The nameless point, western edge of the high tableland (meseta) marked with number 316, accessible stretch, 317, and unnamed point, 318, separating the hydrographical basin of the *Chilian river Huemules, probably a tributary of the river Aisen*, from that of the Argentine river Mayo (Senguerr)." This passage involves another disregard of the Treaties. None of them say one single word as to the rivers which belong to either country, for the simple reason that so long as the boundary along the high summits of the Cordillera de los Andes has not been marked out, it is not possible to determine how far the rivers nearing it belong to one country or the other. Notwithstanding this, the Chilean Expert considered himself authorized to declare that the river Huemules is Chilean, and to reach that conclusion his only foundation in this case is the *probable* direction of one river branch. The knowledge of the details of a boundary line which is based upon the configuration of the ground must be obtained by accurate observations on the spot, but the Chilean Expert, forgetting this elementary principle of geography, judged it unnecessary to obtain this previous knowledge, and as the Chilean Sub-Commissions had not visited the region of the continental divide when in 1898 the Experts met in Santiago, and as it was necessary to show the line on a map, Señor Barros Arana copied the divide south of Lake Fontana from the preliminary sketch published in 1896 by Dr. Moreno, before his appointment as Argentine Expert, but without taking into account that Dr. Moreno states in the report which accompanied the map, that this divide was produced in the tableland far to the east of the Cordillera de los Andes.

The Protocol of 1893 prescribes the placing of a landmark in each accessible point of the mountain situated on the boundary line, and the Instructions of January 1, 1894 ordered "to mark out the boundary in the Cordillera de los Andes," and that the assistants of the Expert shall investigate the situation in the said Cordillera of the main chain of the Andes, in order to seek in the same the most elevated crest that may divide the waters, and shall mark out the frontier line in the accessible parts of the range, making the frontier pass between the slopes which descend on either side. The surveyors to be appointed by Her Britannic Majesty's Government will see if the Chilean line between Nos. 311 to 318 has been drawn according to these Instructions. The Argentine Expert has affirmed that this is not the case; Maps VII. and VIII. and the illustrations referred to in this Chapter support his claims.



## CHAPTER XXVI.

- Summary*—1. DIFFERENCES BETWEEN THE EXPERTS TO THE SOUTH OF THE RIVER HUEMULES.  
 2. DIFFERENCES AT THE RIVER FÉNIX.  
 3. DIFFERENCES AT THE LAKE BUENOS AIRES.  
 4. DIFFERENCES AT THE RIVER LAS HERAS.  
 5. DIFFERENCES AT THE LAKE SAN MARTIN.  
 6. DIFFERENCES AT THE BOUNDARY LINE FROM MOUNT FITZ-ROY TO MOUNT STOKES.  
 7. REMARKS ON THE ARGENTINE LINE.

# 1. DIFFERENCES BETWEEN THE EXPERTS TO THE SOUTH OF THE RIVER HUEMULES.

THE Protocol of 1893 established—

“According to the spirit of the Boundary Treaty the Argentine Republic retains her dominion and sovereignty over all the territory that extends from the east of the principal chain of the Andes to the coasts of the Atlantic, just as the Republic of Chile over the western territory to the coasts of the Pacific; it being understood that by the provisions of said Treaty the sovereignty of each State over the respective coast-line is absolute, in such a manner that Chile cannot lay claim to any point towards the Atlantic, just as the Argentine Republic can lay no claim to any towards the Pacific.”

The Argentine boundary line fulfils this provision, and south of the river Huemules and Mount San Clemente (No. 299), situated in the central or main chain, follows the general crest of that main chain to Mount San Valentin (No. 301); from this summit it runs along the same crest as far as a point to the south, where it deviates to the E.S.E.—thus cutting the river Las Heras—in the direction of a gap of the lateral ridge, at an altitude of 1070 metres (3511 feet) above the sea (No. 302), where the river Coligüe rises. The line leaves to the east Lakes Buenos Aires and Pueyrredon, and about three-fourths of the river Las Heras, the outlet of which is in Calen Inlet, which from the western coast of Patagonia penetrates towards the east.

Calen Inlet cuts through the greatest part of the Cordillera de los Andes, in such a manner that the outlet of the river Las Heras lies to the east of the



main chain, as is the case with that of the river Coligüe ; therefore, according to the pre-inserted clause of the Protocol of 1893, the boundary line cannot cut the inlet nor include in Argentine territory the coasts of the Pacific. Bearing this stipulation in mind, the Argentine Expert has drawn his line so as to leave to Chile all the inlet and the surrounding coasts, thus satisfying the conditions required for a good frontier, easy to distinguish and difficult to cross, as it runs over natural and impassable obstacles which completely interrupt the navigation of the river.

But while the Argentine Expert has strictly complied with the Treaties, the line proposed by the Chilean Expert is entirely opposed to them. His line, in the same district, runs not along the main chain, nor within the Cordillera, nor even along the broken chain of the Pre-Cordillera, but across the tableland, in the transversal valleys outside the Cordillera, leaving in Chile a wide expanse of eastern lands which having been before the Protocol of 1893 under Argentine dominion and sovereignty, must continue, according to its stipulations, under Argentine control.

The Chilean Expert has defined his line thus :—

“The point 319, *accessible space*, separates the hydrographic basin of the river Fénix that flows into Lake Buenos Aires, from that of the river Mayo (Senguerr).

“The point named ‘opening of Paricaïque,’ 320, and *unnamed (foot of the tableland)*, 321, separate the hydrographic basin of the Chilean river Fénix from that of the Argentine river Deseado.

“The points 322 to 323 comprise a large tableland, 1500 metres (4921 feet) high, which separate the hydrographic basin of the affluents of the Chilean Lake Buenos Aires from that of the rivers Eque, Teique and Chacamaque.

“The number 324, opening of Jillo, and 325, stretch of high tablelands and mountain ridges, separate the waters that flow into the Cochrane Lagoon, and into two nameless lagoons, which are probably drained by Baker’s Channel in the Pacific, from the Argentine streams Jillo and Olni that run towards the Atlantic.”

In this description the Chilean Expert considers the tableland as being an “accessible space.” Having classified it so under the impression that the continental divide must run in Patagonia along a mountain crest, he gives to the word “accessible” a meaning which is quite different to that generally understood. Plate CXVI., Fig. 1, represents this “accessible space,” which is no other than the general level of the Patagonian tableland, which commands the transversal depression of Lake Buenos Aires, where the river Deseado rises and where the Chilean Expert locates his landmark No. 319.

## 2. DIFFERENCES AT THE RIVER FÉNIX.

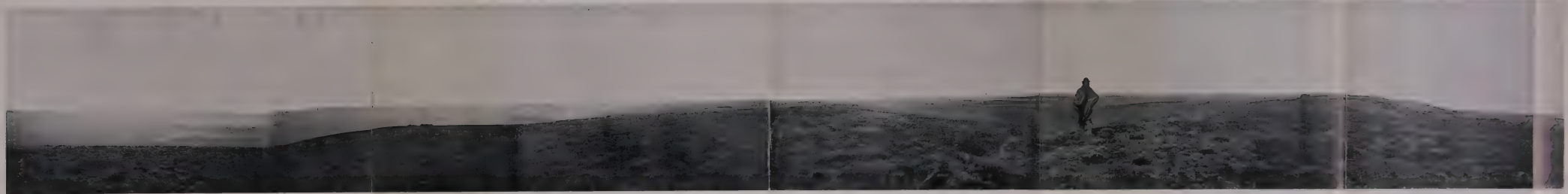
The old maps previously quoted show the "Río de los Rabudos"—the present Aisen—carrying towards the Pacific part of the waters of a large lake situated to the east of the Cordillera, while the other part is shown as running to the Atlantic by the river Deseado or by the river Gallegos. Even the map of Chile corrected by the Chilian Expert himself (see page 53) contains this curious mistake, and Dr. Steffen, in 1897, considered that possibly the southern branch of the river Aisen flows from Lake Buenos Aires. The latter supposition is supported by the appearance from the north of the general longitudinal depression existing between the tertiary tableland and the mesozoic rocks of the Pre-Cordillera. The diagram inserted herewith represents the transversal section of the depression and the tableland.



TRANSVERSAL SECTION BETWEEN THE PRE-CORDILLERA AND THE TABLELAND  
IN THE AISEN REGION.

In the saddle south-west of the Laguna Blanca transversal depression, between the Pre-Cordillera mountains and the tableland, there flow the tributaries of three rivers. Rivulets, feeding the river Aisen, run from the northern slope, others flow to the south to form the river Fénix, and in the centre, in a ravine which intersects the tableland from west to east, rise the western sources of the Guenguel stream. In the ravine, in close proximity to each other, are the sources of the last two named rivers, and, as the erosion there is greater from the west, it is presumable that at no distant date the head waters of the Guenguel will flow into the Fénix river. This is the point where the Chilian Expert proposes to plant his landmark 319, as Señor Barros Arana considered that between the sources of the Guenguel stream, an affluent of the river Mayo, and those of the Fénix river the continental divide was situated, though he was aware that the river Fénix is a normal tributary of the river Deseado, its course to Lake Buenos Aires being only a temporary one.

FIG. 1



THE TABLE-LAND BETWEEN RIVERS MAYO AND COYAIKEN WHERE THE CONTINENTAL DIVIDE OCCURS, AND THE DEPRESSION OF THE UPPER RIVER AISEN.

Tableland.

Foot-hills of the Pre-Cordillera.

FIG. 2



E.

VALLEY OF LAKE BUENOS AIRES—A MORAINIC LANDSCAPE AT RIVER FÉNIX.

W.

1897





To the south, the edge of the tableland commands, from a height of 400 metres (1312 feet), an extensive view of another large transversal depression, where is seen an extensive morainic landscape, which surrounds Lake Buenos Aires; and, between the space left by two periods of retirement of the glacier, the river Fénix flows from the N.W. towards the E.S.E., winding between the glacial undulations. The photograph represented by Plate CXVI, Fig. 2, could not be clearer than it is, and the high cliff of the tableland running west to east, which commands the depression, shows in the plate the depth of the drift, resulting from the first glacial period. This drift material is seen nearly 100 metres (328 feet) thick at some places, and under it are the tertiary sands and clays mixed with volcanic tuffs. To the east, spreading out in the distance, first of all appear the wave-like moraines, and, further on, fluvio-lacustrine terraces. The tableland rises again to the south, black on the summit on account of the basaltic rocks which cover it, and to the E.S.E. small distant eminences testify to the presence of craters of a later epoch of volcanic activity, subsequent to the excavation of the transversal lacustrine valley. To the south-west, the great lake Buenos Aires penetrates among the mountains, which increase in height towards the west; and to the west, the jurassic and cretaceous mass, and the neo-volcanic rocks of Mounts Ap Ywan and Castillo, with snowy summits, appear. A small glacier, still existing, feeds the river Fénix.

If the course of the river Fénix be followed from its source in its windings among the moraines and small lagoons, generally now dried up, a point is reached where this river bends suddenly from the S.E. to the W.N.W., with a sharp elbow again turns to the south, and then to the west, to empty itself finally into the large lake. In the sharp elbow existed, until 1897, the large bed of a dried-up pool, and continuing to the east, the general ancient course of the river was to be seen in the channel of an old outlet of the former extension of the lake; several stepped terraces that surround the lower depression present other channels and occasionally indicate other outlets of higher levels of the same lake.

Dr. Moreno, who, previous to his being appointed Argentine Expert, visited the region and observed these beds in 1896, came to the conclusion that the change in the course of the river Fénix was due to a very recent capture of its waters by a stream eating from the west, assisted by the crumbling of the banks of the river, which are formed of sand and gravel. Both the general course of the river and that of a stream which descends in an opposite direction from the tableland, and which joins the river Fénix immediately after its bend to the north-



west, show that the change of drainage of the valley is abnormal. Dr. Moreno thought that the accuracy of this observation could be practically ascertained by re-opening the closed channel, and sending through it the waters of the present river Fénix : but though during his journey he had not at his disposal enough time to do so, he was convinced that it could easily be done (see page 492), and in the following year, having the necessary means, he tried the experiment, and it proved that he was right.

It was thus demonstrated that between the bend of the river Fénix and the river Deseado there was nothing like a mountain ridge, notwithstanding what has been stated by the Chilian geographers, who although none of them were personally acquainted with the region, persisted in maintaining that all the waters running to the Pacific coast had their origin within the Cordillera de los Andes. The Chilian Minister in Buenos Aires, misled by the data of those geographers, made a representation to the Argentine Minister for Foreign Affairs on account of the fresh direction taken by the river Fénix, though the course of this river is in a region where, according to the Treaties, no dispute could arise between the Experts, during the tracing of the frontier line. The note of the Chilian Plenipotentiary confirms the Argentine Expert's assertion.\*

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\* Memoria de R.E. de la R.A., 1899. The Chilian Minister said :—

P. 157.—“In order to fulfil the purpose of removing every disturbing cause during the work of delimiting our boundaries, my Government likewise directs me to bring to the notice of Your Excellency some data which they have received from the head of the Chilian Commissions, who has just visited the Patagonian region.

“The nature and gravity of these data would justify a serious investigation, but the Argentine Government alone is in a position to order it with a certain prospect of succeeding in establishing the real responsibilities. Having no doubt that Your Excellency must take a similar view of the expediency of the said elucidation, I proceed to summarise a memorandum now before me, by the head of the Chilian Commissions.

“Lake Buenos Aires has its outflow into the Pacific. It might be alleged that the exact point of its outflow is unknown up till now. But it is, on the one hand, an incontrovertible fact that it does not empty into the Atlantic, and on the other, the utmost that could be said would be that its hydrographical dependence is doubtful. In either case both countries ought to abstain from acts implying possession, and far more from acts tending to alter its hydrographical dependence, whichever it may be.

“Now it appears, from personal inspection by the head of the Commissions who visited the locality on February 21 last, that at that date, there existed a trench or artificial deflection, recently opened, that carried off a portion of the waters of the Fénix river,—the sole eastern affluent of Lake Buenos Aires, and therefore belonging to the hydrographical region of the Pacific Ocean,—to the neighbouring bed of the Deseado river, which belongs to the slopes of the Atlantic.

“When, for what purpose, and by whom would this work have been executed? At pages 104 and 105 of the book published in 1897, under the title of *Apuntes preliminares sobre una excursión á los territorios del Neuquén, Río Negro, Chubut y Santa Cruz, etc.*, by Dr. Francisco P. Moreno, Expert on behalf of the Argentine Republic, in his capacity as Director of the Museum of La Plata, the following passages are to be read: ‘The river Fénix which formerly ran undeviatingly towards the Atlantic, was interrupted in its course by one of those phenomena common in the rivers running through loose, mainly glacial, soil. A fall of loose stones sufficed to divert a large part of its course, carrying the same to the lake,—the outlet of which I am

The Cordillera de los Andes is the boundary between the two countries. By the simple opening of a trench the Argentine Expert has succeeded in proving that the Cordillera does not exist to the eastward of the upper course of the river Fénix, since it would be absurd to suppose that this gigantic mountain chain would be thus cut through by the hand of man. Consequently, the operation to which the Chilean Minister referred had been carried out to the east of the Cordillera, and therefore, in Argentine territory. As already said, the Chilean communication itself shows this to be the case. The memorandum of Señor Alejandro Bertrand, the chief of the Chilean Commissions, does not, in the passage transcribed by the Chilean Minister, say a single word that

still unaware of,—whilst on the east there is no water except during the great floods, when it overflows, and forms a small stream in the old channel, which is almost filled up at the present time,—*but a few hours' work would suffice to cause these waters to resume their original direction, and all to flow towards the Deseado river. . . .* If time had permitted it, I should have re-established the stream along its old channel. . . . If the Government should decide to form a colony at this place, it is my belief that it would not cost a penny to divert the waters of the river Fénix and those of the Upper Deseado river into the Atlantic, and the practical results of this work would be considerable, for if this fine port were made available, easy communication with the fertile Andean region would be established. . . .’ The present Argentine Expert thus declares that in his capacity as Director of the Museum of La Plata (post which he occupied in April 1896, when the journey took place) he would have turned the waters of the Fénix river into the bed of the river Deseado, *had he disposed of the necessary time to carry out that work.*

“It would be useless to enter upon the question as to whether the bed of the Deseado river is or is not the former channel through which at any time flowed the waters of the river Fénix. The Treaties can only refer to the present state of things; that of 1881 clearly states that the frontier line is to run between the slopes (‘*vertientes*’) *that descend* to one side and the other, and not between those which *may have descended* at a more or less remote (and quite hypothetical) period, and far less between those which *might descend* after having effected such or such a work of diversion, even though a very few hours’ work might suffice for that purpose. On December 25, 1897, there passed through Barrancas Blancas, along the banks of the Senguerr river, some 200 kilometres to the north of the river Fénix, the assistant of the Head of the Chilean Commissions, Señor Oscar de Fischer, on his way to meet his chief, and going towards the Santa Cruz river. At that place were deposited in the house of the Italian trader, Artemisio Cassaresa, sundry articles belonging to the Eighth Argentine Sub-Commission of boundaries, one of whose sections was in the immediate neighbourhood of Lake Buenos Aires. Among those articles Señor Fischer noticed a plough, two ox-spades and fifteen hand-spades, implements but little suitable for the purposes of the Commissions. As Señor Fischer enquired of a man of the name of Catanio, who had charge of these implements, for what they were to be used, the latter replied that they were to be used for ‘diverting the outflow of Lake Buenos Aires.’ Continuing his journey southwards, and three days afterwards, Señor Fischer met two carts of the Eighth Argentine Sub-Commission coming from Lake Buenos Aires, on their way to Barrancas Blancas, in quest of provisions, as the drivers stated. Passing subsequently to the east of the small lakes that give rise to the Deseado river, Señor Fischer was enabled to observe that this river received no water from those lakes, a circumstance that drew the attention of the guide of the expedition, a native, well acquainted with the locality.

“About two months later, coming from Santa Cruz river, where he had met his assistants, arrived the chief of the Chilean Commissions, who came to survey the ground where his staff were working. Having met, near Lake Buenos Aires, the chief of the Ninth Chilean Sub-Commission, he learnt from the latter that when the Sub-Commission had passed through Barrancas Blancas at the end of January, the tools seen by Señor Fischer were no longer there. In order to verify whether these had been used for the announced work, the Chilean engineers there proceeded on February 21 to the spot called Parisaïque, where the river Fénix coming from the north-west, changes its course to the west, and they were able to assure

can be taken to mean, even remotely, that the region in question is situated in the Cordillera de los Andes, in the summit of which, according to the Treaties, the boundary must run. The cause of his silence on this point is obvious: being personally acquainted with the ground, he could not say that the ditch in the river Fénix was carried out across that Cordillera which he recognised,

themselves of the existence of the work of diversion recently executed, in the shape of a small channel through which there trickled a minute portion of the waters of the river Fénix, in the direction indicated by a line of points in the plan accompanying Señor Moreno's book.

"So recent was the work, that the water had not yet entirely refilled the first series of small hollows that exist there, and did not yet reach the channel proper of the Deseado river. According to the investigations which the chief of the Chilian Commissions was enabled subsequently to make, by speaking with several persons at Teca, it seems that the work was done during the month of January by hired Welsh colonists, brought for the purpose from a great distance, from the Chubut region, by the Eighth Argentine Sub-Commission.

"The chief of the Chilian Commissions and his assistant were enabled to verify that there do not exist in the neighbourhood of the river Deseado, nor within a distance of hundreds of kilometres, any colonists or inhabitants who could have the remotest interest in effecting the work of diverting the waters of the river Fénix into this river.

"Albeit the preceding data and the consequences legitimately flowing therefrom, do not constitute a conclusive proof, they can do no less than excite the fear that the diversion in question was effected by the order of the present Argentine Expert, or with means supplied by the Commissions under him.

"With regard to the object which he may have had in view in effecting this work, it can be no other than that enounced in the quoted portions of his work, and other analogous found at pages 33, 44, 107, etc. of the same book, all tending to show the '*scanty orographical value* of the phenomena that produce the division of the waters,' and that such facts cannot be taken as 'permanent geographical facts.'

"He may have sought them, to prove that the course of the river Fénix towards the Pacific is not a 'permanent fact,' by artificially diverting it towards the Atlantic.

"Such is the extract from the data which my Government has deemed it necessary to bring to Your Excellency's notice, for, in harmony with the sincere cordiality which must reign over the relations of two peoples whose interest it is to define their frontiers without untoward difficulties, it behoves them to clear up all doubts of a disturbing nature.

"The attempt to bring about an artificial alteration of the natural line which the Protocol of 1893 terms the 'geographical condition of the delimitation,' has not been the work of Chilian delimiting commissions, nor of authorities or colonists. If those who are responsible are under the jurisdiction of the Government of Your Excellency, the Government which I represent does not doubt that these proceedings will give rise to strict corrective action (Buenos Aires, May 12, 1898)."

The Argentine Minister for Foreign Affairs answered on July 27 thus: P. 170—" . . . The Minister then treats in great detail of certain works which, according to the reports of the Commissioners of his Government, were executed at the sources of the river Fénix for the purpose of augmenting the waters of the Deseado river, which disembogues into the Atlantic Ocean, such work consisting in a small channel through which there trickled a minute portion of the waters of the Fénix river, in the direction indicated by a line of points in the plan accompanying Señor Moreno's book, the work being so recent that the water had not yet entirely refilled the first series of small hollows that exist there, and did not yet reach the channel proper of the Deseado river.

"The account itself given above, and which Your Excellency details and comments upon at great length, demonstrates the scanty importance of the facts adduced, and the absence of any consequence attaching to them in their bearing upon the operations of delimitation.

"Before being acquainted with the antecedents mentioned by Your Excellency, and which do not lead you to any sure conclusion, the Argentine Government had had information of the same through the publications of the press; but, weighing their importance in a spirit of calmness, as it has acted in the gravest conjunctures, they believed, as they still believe, that they were not worth taking up their attention inasmuch



before then and afterwards, as separating Chile from the Argentine Republic.\* The representation of the Chilean Minister was, therefore, calculated to disregard the letter and the spirit of the Agreements, and, as such, was not taken into account by the Argentine Minister for Foreign Affairs.

The house of the trader Artemisio Cassaresa, at Barrancas Blancas, to which the Chilean Minister made reference, is at about one hundred miles to the east of the summit which forms the boundary; and as it is stated that this point is to the north of the river Fénix, and as there the direction of the Cordillera is north and south, it must be reckoned that the distance between the summit of the Cordillera and the bend of the river is a long one. Señor Fischer saw in that house "a plough, two ox-spades and fifteen hand-spades," implements which he knew were for the purpose of "diverting the outflow of Lake Buenos Aires." Continuing his journey southwards, he met, on the way from Lake Buenos Aires to Barrancas Blancas, "two carts," in which, as Señor Bertrand ascertained later on, the said implements were conveyed to Fénix river. The descriptions, by the same Chilean geographers, of their explorations in the southern Cordillera, teem with accounts of the great difficulties they encountered when crossing the range; and the single fact of carts having crossed from Lake Buenos Aires to Barrancas Blancas, between which no road had, up to that

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as, even taking them as exact, they in nowise alter the pre-existing situation which was perfectly known and verified by the very quotations made by Your Excellency from Señor Moreno's book.

"The Argentine Government have not thought, nor do they think it to be their duty, to proceed to verifications of facts, which even if correct, are devoid of importance, and neither affect nor alter the rights of the neighbouring countries, whether they were brought about by the employees of the Argentine Expert in verification of their surveys, or by the inhabitants of those regions who needed a greater quantity of water for the irrigation of the land occupied by them.

"In any case Your Excellency has stated that 'the Treaties can only refer to the present state of things; that of 1881 clearly states that the frontier line is to run between the slopes ('vertientes') that descend to one side and the other, and not between those which may have descended at a more or less remote (and quite hypothetical) period, and far less between those which might descend after having effected such or such work of diversion, even though a very few hours' work might suffice for that purpose.' And such, indeed, appears to be the case. According to Your Excellency's report the work is done, part of the waters that ran westwards now run eastwards through the 'small hollows that exist there,' a small trench having sufficed to prove the phenomenon or carry the waters. But all this, whatever may be its importance in another sense, has none as regards delimitation, because things will remain and do remain in respect of the latter in the same position that they held previously to these acts. The only point of which I would remind Your Excellency is that the Treaty of 1881 and the Protocol of 1893 state that: 'The Cordillera de los Andes being the boundary between the Argentine Republic and Chile from north to south as far as parallel 52° of S. latitude,' 'the frontier line shall run in that extent along the most elevated crests of the said Cordilleras, that may divide the waters, and shall pass between the 'vertientes' that descend one side and the other'; the word 'vertiente' being understood, according to the Spanish language, and to the opinion of distinguished geographers, and to that of the Chilean Expert himself, to mean, not the sources of the rivers, but 'the slopes of the mountains down which the waters run.'"

\* The International Geography, London, 1889, Chile, by Alejandro Bertrand, p. 843.

time, ever been constructed, is likewise a proof that the Cordillera is not situated between those two points. Moreover, the description and number of the implements mentioned by Señor Bertrand, the whole of which were never used, confirms that fact. It is not likely that, with a plough, two ox-spades and a few shovels, the watershed of the formidable snow-covered Cordillera could be diverted; though, indeed, they are often sufficient, as in this case, to restore into their original courses streams which have become silted up.



THE DITCH OF THE RIVER FÉNIX, AS IT APPEARED IN APRIL 1898.

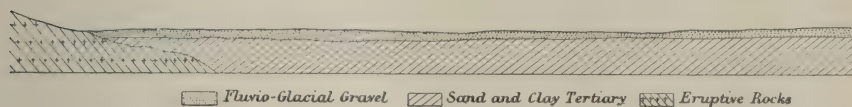
The rectification of the course of the river Fénix was made at the beginning of the month of February 1898, by six men in eight working days, less than 1650 cubic yards of earth being removed. The normal bed of the stream was thus cleared out, and on its primitive banks the remains of an Indian encampment of very recent date were discovered. The surveyors of the Chilian Commission were able to see that the water was beginning to flow in its old direction,



though it did not yet reach the river Deseado. Two months later, however, when Dr. Moreno visited the district, he found that his anticipations were quite realised, and that the river Fénix had definitely returned to its old channel. It is now again a tributary of the river Deseado.

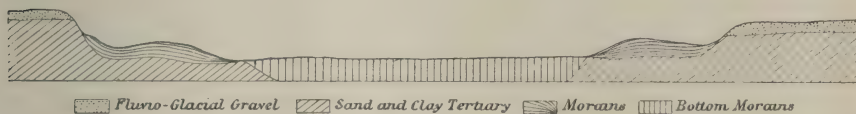
In the expedition made into the interior of Patagonia, the companions of Simón de Alcazaba, in 1535, found a great river, which appears to have been the river Deseado. However, this river was afterwards dried up completely, and only contained a few small pools when visited by Dr. Moreno in 1876. There is no doubt that its disappearance has been due, among other causes, to the change in the courses of some of the Andean tributaries of the river.

The diagram here inserted shows the tableland between the valleys of the



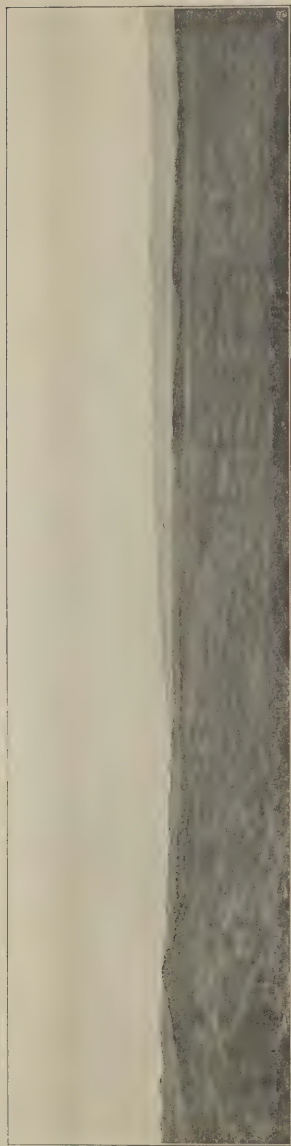
DIAGRAMMATIC TRANSVERSAL SECTION OF THE PATAGONIAN TABLELAND.

upper Aisen and the Fénix, which can be applied to the region to the south of the Senguerr river, and demonstrates that geologically the interpretation of the Chilian Expert on the main chain of the Andes is also indefensible. In this tableland, and in the valleys shown in the next diagram, the abnormal



DIAGRAMMATIC SECTION OF THE TRANSVERSAL VALLEYS EXCAVATED IN THE TABLELAND OF PATAGONIA.

continental divide is produced, and in the case of the Fénix valley it occurred, until 1898, between the lines of frontal moraines. To the east of the eastern moraine flowed at that time a rivulet—the greater part of the bed of which was at times dry—in the direction of the river Deseado, occupying the bed of the old outlet of Lake Buenos Aires; the western moraine separated this rivulet flowing towards the Atlantic from the river Fénix. Plate CXVII. shows the course of this river, and the figure inserted herewith gives a good idea of the glacial accumulations in the valley which are not in the least interrupted by the



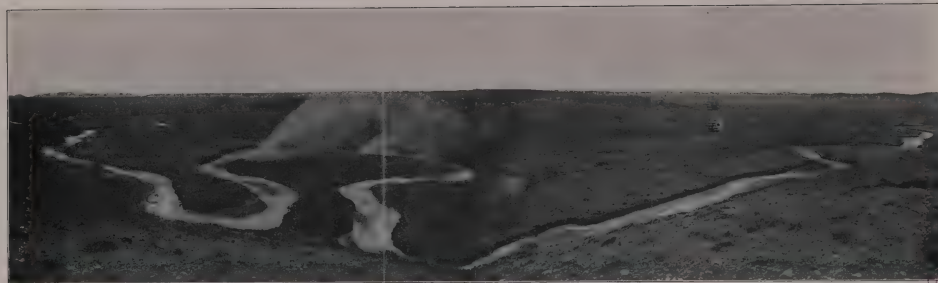
MORAINES OF THE RIVER FÉNIX, TO THE WEST OF THE CONTINENTAL DIVIDE.

continental divide. To the west another line of moraine separates the south-west bend of the river from the lake. Plate CXVIII. represents the sharp bend of the river, which is not entirely visible, being concealed by the general western embankment. The Chilian Expert has named this spot "*Opening of Paricaque, 320,*" but this description is erroneous, because an *opening* implies that it is surrounded by higher ground, which is contradicted not only by Nature but also by the Record of August 29, 1898, where the Chilian landmark 321 is indicated at the "foot of the tableland," being shown in the Chilian map some miles to the south-west of No. 320.

The plans, plates and figures will enable the Tribunal to appreciate the position of the features in this region. *The true crest of the Cordillera de los Andes* is not visible from *Pariaiken* (this word means in the Tehuelche language, *camp full of rushes*), as it is situated about seventy miles to the west. This crest culminates in the Mount San Valentín, 3876 metres (12,716 feet) high, while *the summit of the supposed main chain of the Andes of the Chilian Expert, to the east of the Fénix*, before the latter returned to its channel, rose sixty centimetres above the ditch, which is at 360 metres (1181 feet) above the level of the sea, and 300 metres (984 feet) or more below the general level of the Patagonian tableland. Generally, the cases of continental *divortium aquarum* to the east of the Cordillera do not appear on hills, but in deep depressions of the Patagonian tableland, or in the tableland itself.

It is unnecessary to repeat that no mountain

*Northern Table-land.*



RIVER PÉNIX AND ITS VALLEY TO THE WEST OF THE PRETENDED CONTINENTAL DIVIDE.

*From p. 500.*



*Northern Table-land.*

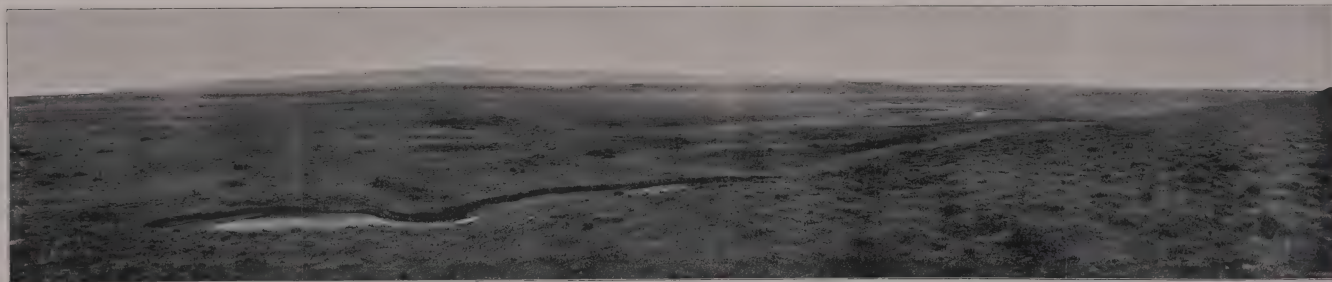
FIG. 1.



*E.N.E. Table-land.*

*The Bend.*

FIG. 2.



FIGS. 1 AND 2.—VALLEY AND RIVER FÉNIX AT THE BEND OF PARIKÉN, WHERE THE CHILIAN EXPERTS LOCATE THE HIGHEST CREST OF THE ANDES THAT DIVIDE THE WATERS.





whatever exists in this region to the east of Mount Ap Ywan, on the north of Lake Buenos Aires, and Mount Jeinemeni on its southern belt, both of which belong to the Pre-Cordillera; that only the tableland covered from time to time with lavas extends to the south, east and north, without the slightest alteration in its peculiar horizontal steps; that the region where the Chilean Expert traces his line is throughout its length Argentine territory; and that the Argentine Expert was justified in his experiment on the river Fénix.

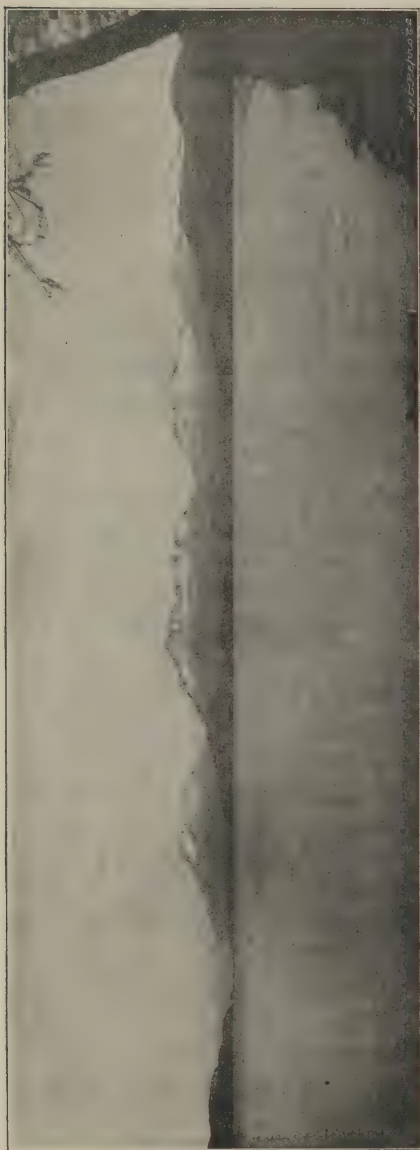
Señor Alejandro Bertrand, as already said, has stated that "*Chile is a relatively narrow strip of land, stretching from 18° to 54° S., between the Cordillera de los Andes and the western coast-line of South America,*" and that the Cordillera de los Andes separates it from the Argentine Republic. In making this statement he could not consider that the Cordillera de los Andes, at the latitude of the bend of the river Fénix, lies where the Chilean Expert thinks, nor that the bend of that river is on the western slope of the said Cordillera; but, on the contrary, he rejects Señor Barros Arana's proposal, by the simple fact of mentioning as a boundary the Cordillera de los Andes, along the summit of which the Argentine line runs at about seventy miles west of the point where the Chilean landmark 321 is proposed to be located, not in mountains or in hills, but only in a sandy and gravelly plain.\*

### 3. DIFFERENCES AT THE LAKE BUENOS AIRES.

The stream which captured the river Fénix from the west and flows from the southern tableland, passes in its course only through fluvio-glacial drift and volcanic ashes, which form the eastern boundary of the present extension of Lake Buenos Aires. Plate CXIX., Fig. 1, representing the great transversal valley which extends from the Andes to the Atlantic from the northern tableland; Fig. 2 of the same Plate, showing the same valley from a point situated to the south, with a large part of the eastern bay of the lake; and the figures in the text give an exact idea of the whole of the details of the region where the Chilean Expert proposes to locate his landmarks Nos. 319 to 321 in the valley. There is not the least indication of mountains, hills, nor gaps, but if the

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\* Chile, by Alejandro Bertrand, Professor of Topography and Geodesy at the University of Santiago, Chief Engineer of the Commission of Delimitation with the Argentine Republic, on pages 843-848 of the *International Geography*, edited by H. R. Mill, London, 1899.



LAKE BUENOS AIRES, TO THE W.N.W.

view is turned to the west, the orographical features in which it is imperative to look for the natural boundary agreed, rise with so strong a character that it is impossible to deny that there, in the white serrated ridges bounding the further horizon, must be traced the line of the Treaties.

It has been said that some of the sources of the river Aisen are situated in the saddle between the Guenguel tableland and the eastern slope of the Pre-Cordillera, and that other sources rise in the slopes, in the sculptured flank of Mount Ap Ywan, but it is principally fed by a small glacier still existing there. The view from that mountain is very extensive to the east, north, south and west, comprising the vast basin of the lake, the tableland, and the transversal depression in which rise to the east the Fénix and Deseado. In this direction only the waved morainic landscape is to be seen; and, in the distance, emerging from the boulder accumulation, gravel and sand, small volcanic craters and the horizontal lines of the fluvio-lacustrine terraces; immediately at the south-eastern foot, the blue waters of the wide bay, bounded to the south by the lava-capped tableland; and

*Southern Table-land.*

FIG. 1.



*Moraines.*

*Moraines.*

*River Fénix.*

MORAINES OF THE VALLEY OF RIVER FÉNIX AND THE SOUTHERN TABLE-LAND CAPPED WITH LAVA.

*Ancient Eastern Outlet.*

*Pre-Cordillera.*

FIG. 2.

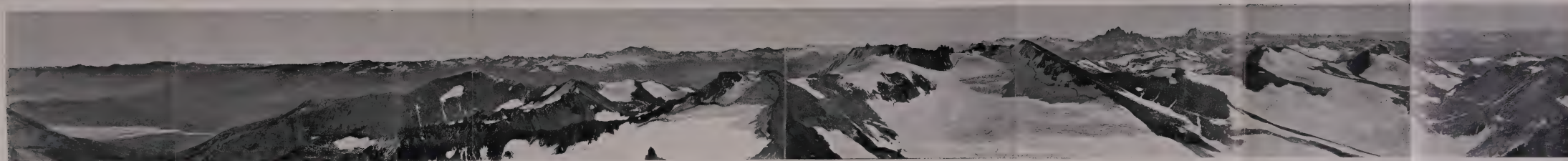


EASTERN PART OF LAKE BUENOS AIRES, SHOWING THE ANCIENT ATLANTIC OUTLET.





FIG. 1.



THE CORDILLERA DE LOS ANDES, AND THE NORTH-WESTERN PART OF THE BASIN OF LAKE BUENOS AIRES (FROM MOUNT AP. YWAN).

Mount Ap. Ywan.

FIG. 2.



LAKE BUENOS AIRES FROM THE SOUTH.

[Over p. 313.]



between these and the continuation of the hills of the Pre-Cordillera, another saddle, wider than the northern one, from which flow to the lake the waters of the rivers Antiguos and Jeinemeni, while to the W.S.W. is seen part of the fjord-like extension of the lake. Plate CXX., Fig. 1, shows the impressive scenery in the opposite or western direction. Here there are no long extensive plains, but the ridges forming the Cordillera de los Andes, which, to the west of the depression separating it from the Pre-Cordillera, rises majestically from north to south, with its high peaks, about 4000 metres (12,500 feet) of altitude, capped with snow and ice.

This rugged panorama is the clearest proof that the real facts established by Nature are not in accordance with the words of the Chilian Expert, who stated in the Record of August 29, 1898, "that the boundary line he proposes runs along all the highest crests of the Andes which divide the waters." The surveyors to be appointed by Her Britannic Majesty's Government, when examining that region, will surely look in vain for this line of the highest crests of the Andes in the bend of Pariaiken, i.e. in the "opening of Paricaique 320," and in the "unnamed (foot of the tableland) 321" (Plates CXVII. to CXIX.), while, at the same time, they will recognise that the summit of the main chain of the Andes is formed by this serrated snow-line, rising to the west of Mount Ap Ywan. Mount Ap Ywan belongs to a group of mountains of the Pre-Cordillera, constituted by mesozoic and neo-volcanic rocks which extend from the south of Lake Elizalde to the shores of Lake Buenos Aires, forming a curve from north-west to south—containing several high peaks, the principal of which is Mount Castillo (2670 metres; 8760 feet), to the W.N.W. of Mount Ap Ywan (2315 metres; 7595 feet)—which bounds to the north and north-east, the lower valley of the river Aisen and to the south and south-west the basin of Lake Buenos Aires.

At the western foot of these mountain groups there are undulating lands, deeply eroded, in the hollows of which lakes and lagoons exist, the principal of those being Lake Lapparent, situated to the west of the river Ibañez, which rises in the southern slope of Mount Castillo, cuts its way into the same slope of Mount Ap Ywan, and empties itself in a closed bay of Lake Buenos Aires. This lake extends in a long curve from east to south-west, narrows itself where the axis of the Pre-Cordillera is cut by its waters, and opens to the west in two arms, one to the north and the other to the south. The northern one stretches as far as the alluvial fan of the river Murta, which descends from the north through a valley,

varying in its width between three miles and one hundred yards at narrow places, and extending in that direction in an undulating depression, which is probably the same as that seen to the south-west of Lake Elizalde, and in which



LAKE BUENOS AIRES, TO THE WEST.

there must exist another lake which feeds the river Murta. The river receives two important tributaries from the west which descend amid glaciers from the Cordillera, the real Cordillera de los Andes, which forms an immense compact wall from the river Huemules towards the south. Among the ravines running from the west to Lake Buenos Aires, are seen snow-capped peaks the slopes of which are occupied by extensive glaciers that send their waters to the lake, into which flow, by the rivers Engaño and Deltas, the waters of the eastern slope of the mountain mass culminating in Mount San Valentín, 3876 metres (12,714 feet); while, to the east, the Resbalón drains, very probably, the waters of Lake Lapparent. The Pre-Cordillera block is isolated to the east and north, bordering Lake Buenos Aires with mountains which reach 1600 metres (5249 feet). The lake terminates to the south in a gorge, by which it flows to another but smaller lake, named Lake Soler, which receives in its western branch the river of that name formed by the melting of the glaciers of the Cordillera. Plate CXX., Fig. 2, represents the eastern part of Lake Buenos Aires, where until

very recent times its Atlantic outlet was to be found; it shows, besides, a landscape similar to those to be observed to the east of all the lakes lying at the eastern slope of the Cordillera, which advance to the plain breaking through the Pre-Cordillera.

The great rushing river Las Heras flows from the southern extremity of Lake Soler, and is undoubtedly the most voluminous river of Patagonia. This river runs in the continuation of the longitudinal depression of the eastern foot of the Cordillera, cut off to the north and south of Lakes Fontana and Buenos Aires, and which is the same as that noticed in Nahuel-Huapi, containing Lakes Espejo and Correntoso, in Valle Nuevo, in Lakes Fetaleufu, etc., *clearly separating the Cordillera de los Andes from the Pre-Cordillera.*

At the southern bank of Lake Buenos Aires, from east to west, the tableland, with its high walls of lava, 1500 metres (4921 feet), bounds the



LAKE BUENOS AIRES, TO THE WEST.

transversal valley, and terminates to the west, being replaced by a wide saddle, in which, in close proximity to each other, two rivers descend to the lake, the western being the more voluminous. The eastern, called the Antiguos, rises



in the tableland immediately to the south of the vast field of lava which covers it, while the second, the river Jeinemeni, descends from the intermediary general depression separating the Cordillera from the Pre-Cordillera, and *runs entirely between the Patagonian tableland and the Pre-Cordillera.* This river is formed by two branches, the longest of which flows down directly to the north from the saddle mentioned, 1410 metres (4626 feet), which has not been totally destroyed by erosion, and which separates the southern sources of this river from those which descend from the opposite slope to Lake Gio. The second branch rises in



THE OUTLET OF LAKE BUENOS AIRES INTO LAKE SOLER.

Lake Jeinemeni, 730 metres (2395 feet), at the eastern foot of the block of the Pre-Cordillera (Plate CXXI., Fig. 1), which sends the rest of its waters to the Lake Buenos Aires by the north-west and west, and to the river Tamango on the south. That block is isolated, like all those of the Pre-Cordillera, and is bounded on the north and west by the depression of Lake Buenos Aires, on the south by that of the river Tamango, and on the east by that which precedes the Patagonian tableland.

Plate CXXI., Fig. 2, shows the eastern slope of the Pre-Cordillera, the inter-

FIG. 1.



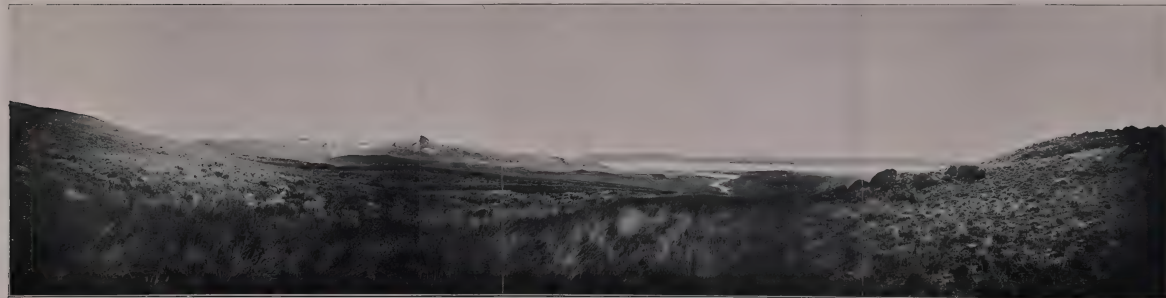
THE PRE-CORDILLERA TO THE WEST OF RIVER JEINEMENI.

*Pre-Cordillera.*

*Mount Ap. Yana.*

*Northern Table-land.*

FIG. 2.



*Lake Buenos Aires.  
River Antigua.*

*Southern Table-land.*

THE LONGITUDINAL DEPRESSION BETWEEN THE PRE-CORDILLERA AND THE TABLE-LAND TO THE SOUTH OF LAKE BUENOS AIRES.



mediary saddle where the rivers Jeinemeni and Antiguos rise, and the tableland : and Plate CXXII., Fig. 1, is a photographic reproduction of the lava fields of the tableland where the Chilean Expert considers the Cordillera rises (Nos. 322 and 323 of his boundary line). The mountains seen in this plate are to the west of the continental divide, and among them Mount Zeballos, 2670 metres (8760 feet), in that tableland to the east of the Pre-Cordillera.

The waters which flow into Lake Buenos Aires, from the region where the so-called continental divide is produced, have become considerably reduced : the

*Mount Ap Ywan.*



THE DEPRESSION BETWEEN THE PRE-CORDILLERA AND THE TABLELAND.

river Fénix no more empties into the lake, and the only stream which does flow into it, on the eastern side is the one coming from the southern tableland ; the river Ibañez carries to the lake the waters of the northern block of the Pre-Cordillera and the rivers Antiguos and Jeinemeni cannot be considered as important tributaries. On the western side, on the contrary, the true supplies of the large lake are the extensive glaciers from Mount San Clemente and the mountains to the south, descending from a general altitude of 3000 metres

(9843 feet), with summits approaching 4000 metres (13,124 feet) as Mount San Valentin (3876 metres; 12,714 feet). These last are the waters mentioned in the Treaty of 1881, since they flow from the two slopes of the main chain of the Cordillera de los Andes, forming its true and normal general watershed.

Maps IX. and X. of this Report will show to the Tribunal the general character of the region, and, besides them, the photographs will facilitate the comparison of the geographical features and position chosen by each of the Experts to locate his boundary line. The Argentine Expert maintains that he has located his line in the summit of the Cordillera, while the Chilian Expert holds that his line runs along *the highest crests of the Andes which divide the waters*, the highest crest characterised by the *accessible space* (No. 319), *the opening of Paricaique*, *the foot of the tableland* (321), and *the large tableland* (322 and 323), according to his own classification. The difference in character and the distance between the two lines are so great that it is unnecessary to enter into more detailed explanations. The pretensions of the Chilian Expert are so astonishing in this zone that the best argument in favour of the Argentine claims, besides the maps and photographs already mentioned, will be found in the survey to be ordered by Her Britannic Majesty's Government.

#### 4. DIFFERENCES AT THE RIVER LAS HERAS.

Similar differences of opinion to those that have arisen when locating the boundary landmarks at the neighbourhood of Lake Buenos Aires, have been met with to the south of it, in the volcanic tableland in the Valley of Gio, and in the southern continuation of the said tableland, where exists the separation between the waters running to the Pacific and those running towards the Atlantic by the tributaries of the river Deseado, of the dry rivers which previously emptied to the south of the bay of that name—rivers Salado and Seco—and of the river Chico, a north-western branch of the Santa Cruz. The Argentine Expert has stated that the Cordillera de los Andes does not exist in that region, adding that its main chain rises far to the west of this tableland and the transversal depression.

The Chilian Expert has defined that part of his boundary line thus :—

“The points 322 to 323 comprise a large tableland, 1500 metres (4921 feet) high which separate the hydrographic basin of the affluents of the Chilian Lake Buenos Aires from that of the river Eque, Teique and Chachamaque.

“The number 324, opening of Jillo, and 325, stretch of high tablelands and mountain



*Mount Zeballos*  
(2670 m.; 8760 f.).

FIG. 1.

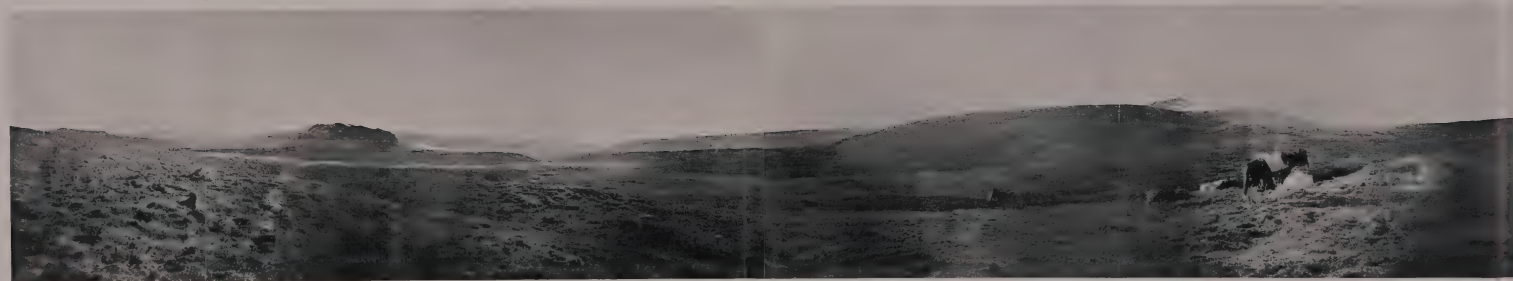


THE TABLE-LAND CAPPED WITH LAVA TO THE SOUTH OF LAKE BUENOS AIRES.

*Pre-Cordillera.*

*Mount Belgrano*  
(2360 m.; 7612 f.).

FIG. 2.



N.W.

*River Belgrano.*

N.

THE LONGITUDINAL DEPRESSION BETWEEN THE PRE-CORDILLERA AND THE TABLE-LAND TO THE NORTH OF LAKE BELGRANO AND TO THE WEST OF MOUNT BELGRANO

[Face p. 112.]



ridges, separate the waters that flow into the Cochrane Lagoon and into two nameless lagoons which are probably drained by Baker's Channel in the Pacific, from the Argentine streams Jillo and Olui that run towards the Atlantic."

Plate CXXII, Fig. 1, represents the region where are located 322 to 323 of the Chilian line in the "large tableland," which is no other than the general Patagonian tableland extending to the Atlantic from the foot of the Pre-Cordillera, and which has not been eroded so actively as the unprotected terraces, intersected in every direction by canyons, generally coinciding with faults produced during the uplifting of the tableland. In the eastern edge the streams Teker and Charcaña, affluents of the river Deseado, rise and run towards the east, through deeply cut beds, and on the tableland itself, vast flows of lava spread from craters still visible, containing in the hollows some pools resulting from the melting of the winter snows. Across these pools probably runs the undefined continental divide of the Chilian Expert, and the points chosen for the landmarks are upon the isolated neo-volcanic mass of Mount Zeballos, 2670 metres (8760 feet) high, separated from the Pre-Cordillera by the saddle already mentioned.

In this saddle, 1410 metres (4626 feet) high, rises the river Jeinemeni, flowing to the north, and the river Gio, which flows to the south, and turning round the south-western edge of the tableland, empties itself into Lake Gio, at the present time without an outlet. This edge continues towards the east and north-east, and at the foot of its highest cliffs extensive lateral moraines exist, remainders of the former glaciers which, coming down from the Cordillera, occupied the Gio transversal depression. Ecker stream descends from Mount Zeballos, crosses the tableland to the east, and after turning in the valley to the south, bends again to the east and forms the southern branch of the river Deseado, thus isolating the extensive volcanic tableland. Ecker stream is the only permanent one at present, as the waters of the depression—formerly occupied by a large lake, of which Lakes Pucyrredon and Gio and Laguna Salitrosa are the remnants, and the Atlantic outlet of which was very probably the river Deseado—are to-day so reduced that they do not reach Ecker stream, but lose themselves in a small salt lagoon, 540 metres (1772 feet) high. Near the west of the swamp which feeds this lagoon are the eastern shores of the former lake, covered with glacial accumulations. The lacustrine bed is wide and terraced, showing different distinct levels of the waters in their fluctuations, and Lake Gio, 455 metres (1496 feet) above the sea, is situated in it to the north-west, bounded to the east by one of these embankments and moraines between the northern table-

land and the isolated neo-volcanic mass of Mount Colorado, which rises in the middle of the valley, commanding to the east Lake Pueyrredon, and to the south Laguna Salitrosa. The bed of the former lake is bounded to the south by the denuded tableland cut throughout its breadth by several streams which flow to the east, as Olmie stream, which forms a lagoon situated in the lavas of the tableland, to the east of Mount Belgrano, another isolated neo-volcanic mass, 2070 metres (6791 feet). At the eastern foot of that mountain on the tableland rises Blanco stream, which runs to the north-east as far as the neighbourhood of



EMBANKMENT AND GLACIER BED,

Showing the retirement of the water of the Lake Buenos Aires as erosion progressed from the west, changing its drainage.

the swamp mentioned, makes a sharp bend to the south-west, and then flows into Laguna Salitrosa: a case analogous to the river Fénix. Laguna Salitrosa has no outlet at present, but occupies a former extension of Lakes Pueyrredon and Posadas, the waters of which are diminishing continuously as erosion progresses from the west, carving deeply the outlet to the Las Heras. In the Patagonian lakes the gradual retirement of their waters is shown not only in the embankments of their shores, but also in the hard rocks which were formerly covered by glaciers and which were polished and carved by the glacial drift. From Laguna Salitrosa to Lake Posadas the ground is flat, and there are evidences of the recent

dependency of the former on the latter. The moraines and fluvio-glacial beds that bound the lagoon to the east are 270 metres (886 feet), Lake Pueyrredon 196 metres (623 feet), and Posadas 200 metres (656 feet), above the sea.

During the printing of this Report, an article has appeared on Patagonia, written by J. B. Hatcher, of Princeton University, who has spent nearly three years in investigating the physiographical features of the region, and his opinions coincide with those of the Argentine Expert as to the geographical position of the Andes, its ranges, and the existence of the continental divide outside of, and to the east of the Andes. He is entirely opposed to the views of the Chilean Expert, with respect to the coincidence of the continental divide with the main chain of the Cordillera, as may be seen in the following paragraphs :—

“ Another feature characteristic of these plains (those of Patagonia) is the series of escarpments, often several hundred feet in height, that terminate a succession of terraces, encountered at varying elevations as one proceeds from the coast inland westward towards the Andes, or also in crossing from north to south any of the great transverse valleys. . . .

“ In many places over the plains the sedimentary rocks are covered with sheets of lava, which have usually had their origin in local dikes or volcanoes. Many of the latter rise high above the surrounding plain as imposing landmarks, serving alike to guide the traveller and lend variety to a rather monotonous landscape. These lava fields are most abundant over the central interior region midway between the Andes and the coast where they cover thousands of square miles. . . .

“ While these lava beds are most frequent over the central interior region, there is an important outlying area near the coast between the mouth of the Gallegos river and the eastern entrance to the Straits of Magellan, with several extinct volcanoes and resulting lava streams, which appear to have been ejected at a comparatively recent date. In some few instances the lavas of the great interior region extend westward quite to the base of the Andes, but as a rule the surface of the plain for a distance of some thirty to forty miles eastward from the base of the mountains is free from lava. It has either never existed there or has been entirely swept away or covered over by glacial detritus, as has been observed in some few instances.

“ That region lying between the western border of the lava beds and the foothills of the Andes is by far the most fertile of the Patagonian plains. Its surface, covered to a considerable depth with glacial deposits, presents a series of ranges of low, rounded hills, left as terminal moraines by the receding glaciers. Such ranges of hills have a trend parallel with the base of the mountains, and are usually separated by broad stretches of meadow land, with numerous small glacial lakes, either occupying slight depressions in the meadows or, as more frequently seen, embraced by the low, rounded hillocks of the terminal moraines. These conditions are especially characteristic in this region over the bottoms and slopes of the great transverse valleys, but they extend also in many places out over the surface of the higher pampas.



"The rolling surface of this western plains region, abounding in wide pasture lands dotted over with sparkling lakes of pure, sweet water, presents a pleasing contrast to the semi-arid region near the coast, and affords a welcome relief to the traveller after a journey across the black, absolutely barren lava beds of the central plains. Its modest, unobtrusive beauty but emphasises the grander scenery beyond, indications of which already appear in the distant ranges of the Andes, whose summits, buried deep in fields of snow and ice, are seen brilliantly white against the intensely black background formed by the storm-clouds of the western sky.

"Entering the confines of the Andes, numerous rivers, deep rocky canyons, broad open lakes of beautiful clear water, fed by glaciers that descend from the snow-fields at the summits, and all the other features characteristic of an intensely rugged mountainous region, thrust themselves upon the attention and excite the wonder and admiration of the traveller.

"The country lying along and within the foothills of the Andes is in many respects the most interesting region in Patagonia, whether considered geographically or geologically. Taking advantage of any of the numerous valleys that extend westward from the western border of the Patagonian plains and penetrate not only the secondary but also the main range of the Andes, finally emptying into the Pacific, many facts may be observed not only bearing directly upon the structural and historical geology of the Andes, but also throwing much light on the agencies which have contributed to the peculiar topography and determined the unique position of the continental watershed at present existing in Southern South America.

"I say unique, for I believe it has no parallel elsewhere. That its true position was quite unknown and entirely unsuspected, even at the beginning of the last decade, is clearly demonstrated by the unfortunate boundary dispute at present existing between Argentina and Chile. . . .

"An attempt at a practical application of the conditions of this Treaty soon demonstrated its impossibility and developed the fact, previously unsuspected, that the continental watershed throughout the entire extent of Patagonia, excepting only a small area about the source of the Santa Cruz river, *was not formed by the main range of the Cordilleras, but lay far to the eastward and in many instances extended even beyond the lowermost foothills of the mountains.* . . . .

"A study of the southern Andes at any point reveals the fact that they are composed of three distinct, parallel ranges, separated by two deep, narrow, longitudinal valleys. The middle of the three ranges is everywhere much higher than the two lateral ranges and may be reckoned as *the principal range of the Andes.* The western lateral range is at present partially submerged beneath the Pacific, but is still distinctly seen in the chain of islands extending all along the western coast. The western of the two longitudinal valleys is at present throughout the greater extent of Patagonia entirely submerged beneath the sea and is now represented by the narrow system of rather deep channels that separates the islands from the mainland, and offers an almost continuously navigable inland waterway extending from the southernmost point of the Brunswick Peninsula to the 42nd parallel of south latitude, or throughout more than twelve degrees, a distance of over 700 miles.

"The eastern lateral range of the Andes is seen in the foothills that rise somewhat abruptly from the eastern plains to a height in places of some 6000 or 7000 feet. They

are composed almost entirely of secondary and tertiary sedimentary rocks, with occasional layers of intrusive basalts, the whole thrown up in a somewhat complicated system of folds of usually monoclines or anticlines terminating towards the west in a lofty escarpment the crest of which overlooks the deep, narrow and irregular, eastern longitudinal valley that separates the eastern lateral range from the central main range of the Andes. . . .

"In many places important streams enter this great longitudinal valley from the eastern plains and discharge their waters into the lakes, which in turn *are emptied into the Pacific through rivers intersecting the main range of the Andes.* This is true of all lakes of this region, with the one noted exception of Lake Argentino and its affluents. The upper course of the great transverse valleys of Patagonia are always directly opposite some of the larger of these tributary valleys, so that at such places *the continental-divide is exceedingly low and inconspicuous.*"

Mr. Hatcher extends thus the Patagonian plains to the foothills of the Andes, and recognises the existence of extensive lava beds in these plains, where the Chilian Expert places the main chain of the Andes, and he states that between these lava beds and the foothills of the Andes there extends a morainic country reaching to the distant ranges of the Andes. He ratifies the fact *that the continental divide, in many instances, extends beyond the lower foothills of the mountains,* and divides the Andes into three ranges: the western, which corresponds to the Cordillera de la Costa, the central, agreeing with the Cordillera de los Andes, and the eastern with the Pre-Cordillera, as they are known further north. Mr. Hatcher accepts the existence of the eastern longitudinal depression which the Argentine Expert maintains exists between the Cordillera de los Andes and the Pre-Cordillera; he confirms also that important streams coming from the eastern plains, *empty themselves into the Pacific, through rivers intersecting the main range of the Andes,* i.e., the Cordillera de los Andes; and as the boundary agreed upon runs along the summit of the main chain, the line must pass across these rivers.

Mr. Hatcher has published in his paper a photograph of the "Canyons of the river Tarde, *foothills of the Andes,*" and as the river Tarde is the southern affluent of Lake Posadas, situated at the eastern foot of the Pre-Cordillera, this lake is undoubtedly to the east of the summit of the main range of the Cordillera de los Andes according to Mr. Hatcher, and hence in Argentine territory.

Plates CXXIII. to CXXVI. will contribute greatly to support the views of the Argentine Expert with regard to the non-existence of the Andes to the east of the Las Heras. Plate CXXIII., Fig. 1, contains the complete panorama of the tableland and its canyons from a point near the confluence of the Charcaña and Ecker streams. It is a characteristic view showing the canyons, the high cliffs

and the lava beds stretching for hundreds of square miles, without the least appearance of a mountain or a hill which can be referred to the Cordillera. Plate CXXIII., Fig. 2—a reproduction of a panoramic photograph from the volcanic edge of the tableland to the south of Ecker stream—shows more or less the same level feature of the region, as well as the small *mesa* or table-hill of Gorro de Poivre, a conspicuous vestige of the general tableland from which it has been detached by erosion and the top of which commands an extensive view of the continental divide in the eroded transversal depression. Plate CXXIV., Fig. 1, contains the same depressions, and shows the undulations of the moraines where the continental divide wanders, surrounded by the high



CONFLUENCE OF THE RIVERS TAMANGO AND  
LAS HERAS.

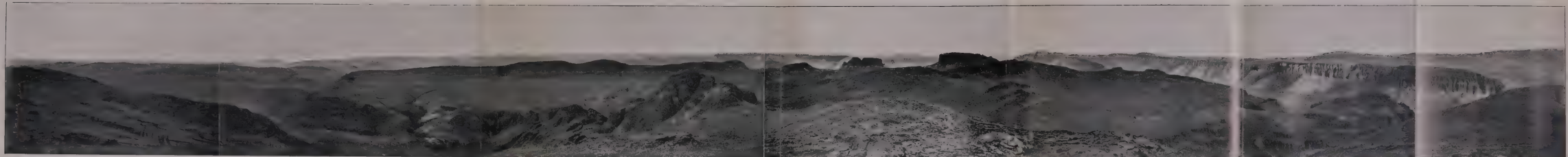
tableland, the horizontal level of which is characteristic of the centre of Patagonia. Plate CXXIV., Fig. 2, represents the tableland to the south of the depression of Gio, and shows the general level of the country where the Chilian Expert maintains that the main chain of the Andes rises.

It is very difficult to determine, either on the tableland or in the depression of Gio, the precise point where the

inconstant continental divide occurs; but what may be safely asserted, without fear of contradiction, is that this region, where the Chilian Expert had located his landmarks Nos. 324 and 325, is outside the Cordillera de los Andes, and thus outside the region where, according to the Agreements, divergences between the Experts can only arise.

It has been said that Lake Gio is fed by a river descending from the saddle which separates the basins of Lakes Buenos Aires and Pueyrredon, and that to the west of this depression is situated one of the isolated blocks of the Pre-Cordillera. In the south-eastern edge of this block rises the river Tamango, which flowing to

*Northern Table-land*



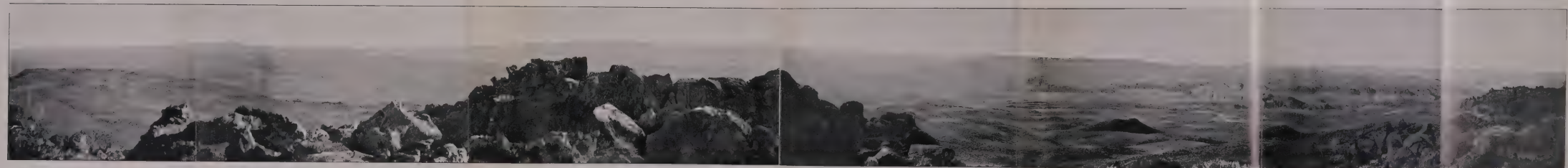
N.W.

*Canyon of Chacabuta*

THE PATAGONIAN TABLE-LAND AND THE CANYONS OF CHACABUTA AND ECKER.

*Canyon of Ecker Stream*

S.E.



*Cerro de Poivre*

*Northern Table-land*

THE DEPRESSION OF GIO FROM THE CANYON OF ECKER TILL THE SOUTH-EAST OF GOMIO DE POIVRE.  
(Mount Colorado is not visible on the West, as it was covered by clouds.)

N

*Canyon of Ecker*

*Eastern Table-land*

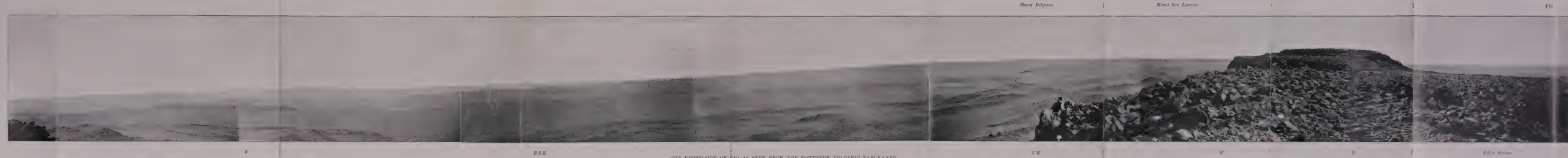
(Page n. 123)

FIG. 2

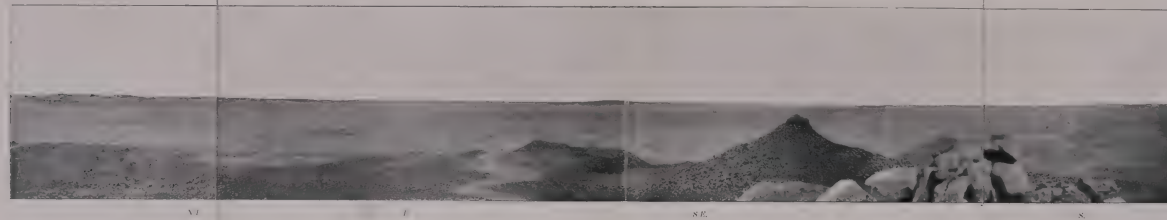




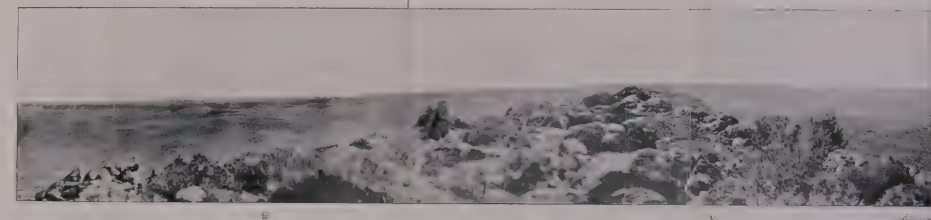




THE DEPRESSION OF 610 AS SEEN FROM THE NORTHERN VOLCANIC TABLE-LAND.



PANORAMA OF THE GENERAL TABLE-LAND TAKEN FROM THE UPPER COURSE OF OLNE STREAM.





the west by the southern foot of these mountains, runs to the river Las Heras, and farther south extending in an open angle, the sides of which are directed to the south-east and W.S.W., lies Lake Pueyrredon. Plate CXXV., Fig. 1, represents this lake from a point situated to the north-east, and comprises the western, southern and eastern part of the depression to the east of the Pre-Cordillera, but to the west of the continental divide or of the Chilian boundary line. Fig. 2 of the same Plate shows the same lake to the south and west of the river Las Heras, into which it flows, and Lake Negro, which drains into the same river, situated to the south-east of Lake Pueyrredon. The Cordillera which lies to the west is not represented in that photograph, being obscured by the clouds. Plate CXXVI.,

Fig. 1, shows the region where the small lakes Sorpresa and Azul are situated to the west of Lake Pueyrredon; and Plate CXXVI., Fig. 2, contains the river Las Heras, between its confluences with the river Tamango and with the river Pueyrredon, in the region of Lake Pueyrredon.

The figure inserted in the preceding page completes the view of the general features of



MOUNT LAS HERAS, IN CALEN INLET,  
TO THE WEST OF THE OUTLET OF THE RIVER LAS HERAS.

the ground, and shows the cliffs between which flow the waters of the Las Heras and the Tamango rivers. The river Las Heras separates the Pre-Cordillera from the Cordillera de los Andes. On page 509 has been reproduced one of the rapids to the south of the source of this river in Lake Soler, near the confluence of the river Pista, which conveys to the Las Heras the waters of the rain, snow and glaciers of the Cordillera. To the south of that confluence this great river turns to the east and receives the waters of the river Tamango, then, passing to the south, and before turning again to the west, unites its waters with those

of the river Pueyrredon and of the smaller lake mentioned before. In that direction it receives another river from the west, which conveys to it the waters of the high Andean crest, and then turns to the S.S.W., receiving affluents from the east and west until it empties itself in the Calen Inlet. To the west is situated, as has been said, the Cordillera, its compact mass extending from the river Huemules in  $45^{\circ} 40'$  to  $47^{\circ} 50'$  S. lat.—i.e. more than two degrees of latitude—crowned by peaks about 4000 metres (13,124 feet) high, and surrounded by enormous ice-fields which render the gorges impassable, giving to this section of the boundary a character approaching to the mountainous region between Lynn Channel and Mount Saint Elias on the north-western coast of North



MOUTH OF THE RIVER LAS HERAS, IN THE  
CALEN INLET.

America. Can there be a better boundary than the summit of this mountain range? The best answer will be found in the figure inserted in the next page, which is a reproduction of a sketch by Señor Von Platten, Assistant of the Argentine Boundary Commission. Along it, the Argentine Expert has traced his line, considering that it must be located there, while the Chilean Expert, ignoring the existence of this impassable mass

of rocks, snow and ice, has gone to the far east to look, but in vain, for a ridge in which to locate his line, choosing at last the low transversal excavations, and the tableland of the centre of Patagonia.

## 5. DIFFERENCES AT THE LAKE SAN MARTÍN.

To the south of Lake Pueyrredon, between the tableland and the continuation of the Pre-Cordillera, exists another saddle, which separates the upper waters of the river Tarde from those of the river Belgrano, an affluent of the

FIG. 1



*Cordillera de los Andes.*

*Mount Colorado.*

*Mount Belgrano.*

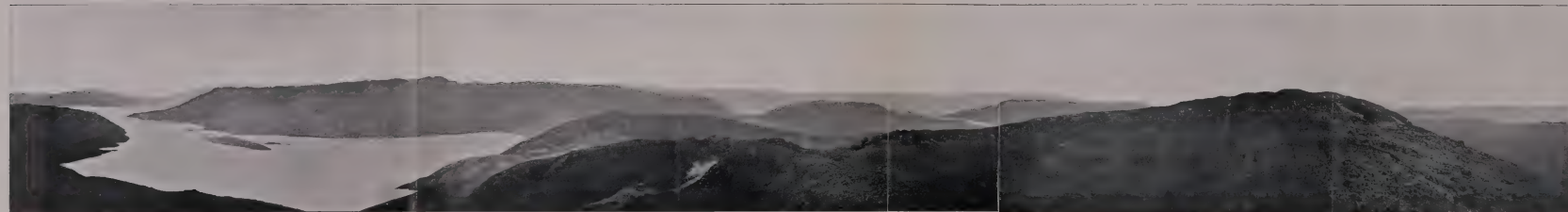
*The depression between the Pre-Cordillera and the Table-land.*

*Lake Puyrredon.*

*Eastern Spurs of the Pre-Cordillera.*

PANORAMA OF THE NORTHERN REGION OF LAKE PUEYREDON.

FIG. 2



*Lake Negro.*

*River Las Heras.*

LAKE PUEYREDON TO THE SOUTH AND WEST, WITH RIVER LAS HERAS AND LAKE NEGRO.



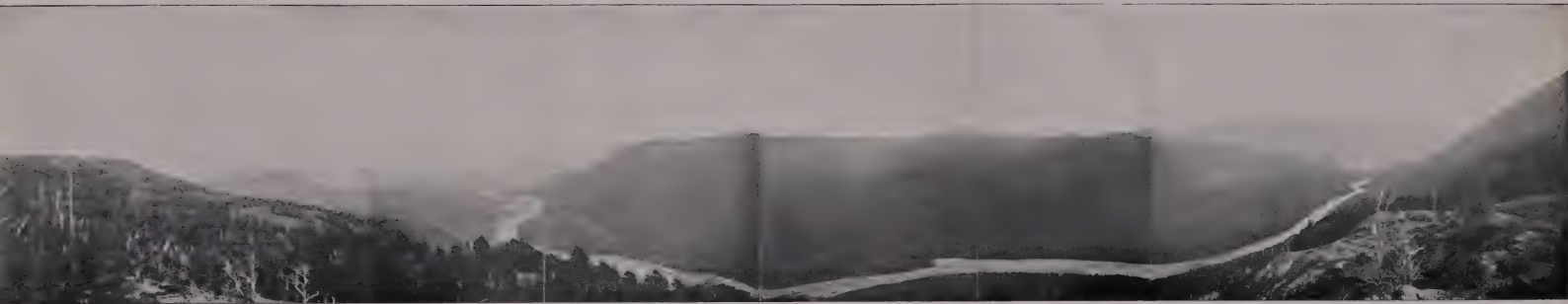


FIG. 1.



THE REGION OF THE LAKES NEGRO, SORPRESA AND AZUL, TO THE WEST OF LAKE PUEYRREDON.

FIG. 2.



*River Pueyrredon.*

RIVER LAS HERAS BETWEEN THE CONFLUENCES OF RIVER TAMANGO AND RIVER PUEYRREDON.

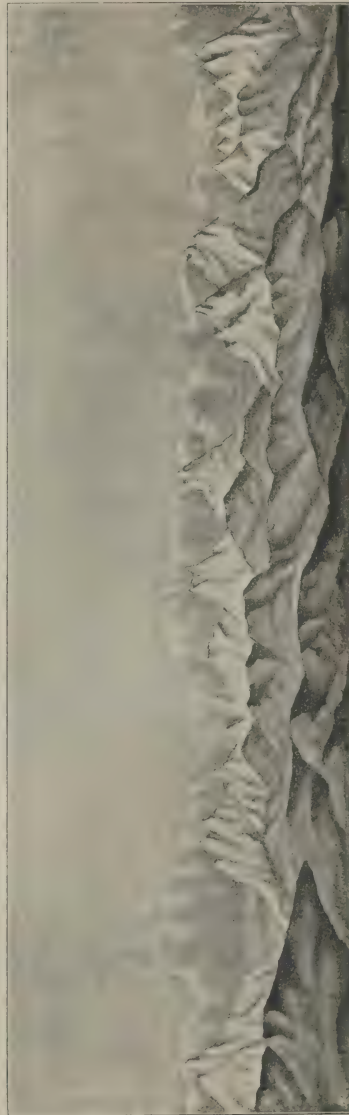
*River Tamango.*



river Chico, the northern branch of the Santa Cruz. At the end of the tableland is the volcanic Mount Belgrano, which is not mentioned by the Chilian Expert in the description of his line, as he states that—

“Number 326 *unnamed Cordillera* separates the waters of the slopes from which run the Chilian rivers that probably flow into the Pacific through Baker's Channel, from the slopes where begins the Argentine river Corpe or Chico, which flows to the Atlantic.”

Plate CXXII., Fig. 2, shows the orographical features of this region seen from the southern slope of the saddle, and shows that the Cordillera de los Andes does not exist there at all, there only being to the east the tableland with Mount Belgrano, and to the west the slopes of the ridge of Las Uñas in the Pre-Cordillera, opposite the block of Mount San Lorenzo where the Pre-Cordillera culminates. The saddle is 1508 metres (4948 feet) high above the sea, and the view which it commands is an impressive one, showing the prolongation of the longitudinal depression between the tableland and the folded ridges of the Pre-Cordillera. The edges of the tableland are abrupt, with high lava cliffs which turn to the south-east and then to the east (Plate CXXVII., Fig. 1). In this direction the river Belgrano flows, winding its way through another transversal depression corresponding to a second system of lakes



THE EASTERN RIDGES OF THE CORDILLERA DE LOS ANDES, TO THE WEST OF THE RIVER LAS HERAS.

that formerly emptied into the Atlantic, and which at the present time drain to the west into the Pacific by the river Mayer and Lake San Martín, into which this river flows. The river Belgrano joins the river Chico at the point where the broad depression narrows, bounded by the general tableland ; to the east of this point is the road south of the river Chico, connecting the southern valleys with the northern one—the road which Señor Bertrand traversed in 1898, during his journey (see page 564, Plate XXI.). The accompanying figure shows the tableland where the road between the river Chico and the Olnie stream



PATAGONIAN TABLELAND, BETWEEN THE RIVER CHICO AND  
OLNIE STREAM.

passes. To the west of that tract no Chilian explorer had penetrated up to that year, and the region from the Gio depression to Lake San Martín was entirely unknown to the Chilian Expert. The fact that the tablelands, valleys, lakes, hills and mountains of the Pre-Cordillera and the Cordillera de los Andes, are not shown in the Chilian maps reproduced in Plates XXIII. and XXIV., proves once more that Señor Barros Arana, when planning his boundary line, had not the least knowledge of that part of Patagonia between his numbers 326 and 329.

Such geographical ignorance has been most prejudicial to the settlement of the Argentine-Chilian boundary question, and it is important to point out that



*North-eastern Table-land.*

*Ancient Outlet.* FIG. 1.



EASTERN PART OF LAKE BELGRANO, SHOWING THE FLUVIO-GLACIAL PLAINS, THE ANCIENT OUTLET TO THE EAST, AND THE GENERAL PATAGONIAN TABLE-LAND.

FIG. 2.



LAKE NANSEN AND THE EASTERN RIDGE OF THE CORDILLERA.

[Face p. 927.]



this ignorance was only on the part of the Chilian Expert, as the Argentine surveyors had, before Dr. Moreno proposed his line, made a general geological, orographical and hydrographical investigation of the Cordillera, and of its main chain through which the line was to run according to the Treaties. The geographical knowledge of that part of Patagonia, up to August 1898, was entirely due to the Argentine parties.

Between the Bay of Santa Cruz and the Bay of San Julián can be seen on the shores of the Atlantic the enormous accumulations of drift material that descended from the Cordillera region in former times; this fact, and the number of terraces (embankments) and dry channels, running in a westerly direction as far as the foothills of the Pre-Cordillera, show the transformations that this region—previously drained by the northern branches of the river Santa Cruz—underwent before being in its present condition.

*In the western depression, the continental divide is as indefinite as in the others to the north, already mentioned, and is similarly produced far to the east of the Cordillera, and beyond the range altogether.*

Mount San Lorenzo, 3660 metres (12,001 feet), is the culminating peak of the Pre-Cordillera to the south of Lake Brown. The waters from the northern slope of this mountainous mass drain to Lakes Pueyrredon, Negro, Sorpresa and Azul, which flow to the river Las Heras. Through a ravine which separates the ridge of Las Uñas from that block, there descends to the south, from the western glaciers, the river Lácteo, which empties itself into Lake Belgrano, after receiving the waters of the small Lake Volcán, fed by the glaciers of a snowy ridge extending to the south from Mount San Lorenzo. Lake Belgrano *is situated partly among the eastern foothills of the Pre-Cordillera and partly in the Patagonian plain.* The accompanying panoramic photograph (Plate CXXVIII., Fig. 1) shows clearly its situation, the old outlet towards the east, the moraines, and the fluvio-lacustrine beds which are the remains of a previous extension of the lake in that direction. The vast undulating plain, cut up by channels, now dry, and covered with enormous glacial deposits on its perfectly preserved terraces, leaves no room for doubt as to its natural dependence on the Atlantic basin, or as to its being on the eastern slope of the Cordillera.

This system of lakes bears great resemblance to the system of Lacar and Perihueico. Immediately to the south is situated Lake Burmeister, very similar in character to Lake Lolog, discharging its waters by the river Robles towards the Atlantic, as the Lolog drains in the same direction by the river Quilquihue.

while Lake Belgrano, like Lake Lacar, empties into the Pacific. Lake Belgrano drains into Lake Azara, and this into Lake Nansen, the waters of which run finally to the Pacific. Both lakes Azara and Nansen are separated from Lake Burmeister by the Sierra de las Vacas, belonging to the Pre-Cordillera, as in the northern zone is the case with the ridge of Perihueico.

The former outlet of Lake Belgrano is now occupied by small lagoons, and the river Belgrano runs some miles to the east; but the meadows and swamps which still exist show that the retiring of the waters is of very recent date.

The accompanying figure reproduces the present outlet of Lake Belgrano into Lake Azara, showing how recent must be the capture of the former, as the breach is still not completely cut. To the west of these two lakes rises the Cordillera de los Andes, its outlines half hidden by innumerable glaciers, extending to the south for a great distance, till it is cut by the river Mayer, which receives the waters of Lake Nansen and part of those of the eastern plain. From the west of the general tableland which commands the river Belgrano, the



RECENT DRAINAGE OF LAKE BELGRANO INTO LAKE AZARA.

previously mentioned depression extends far to the south, east and west. At the west is Lake Burmeister, separated from Lakes Azara and Nansen by the ridge Las Vacas, which drains to the river Belgrano by the Robles stream. To







the south of this stream there are excavated plains, in the terraces of the valleys of which are several little lagoons, and still farther, the river Lista runs from the same ridge till it empties into the river Chico. Between the two rivers



LAKE AZARA, AND THE CORDILLERA TO THE WEST.

lies the bed of a former lake. The Tehuelche Indians told the Spanish explorer Antonio de Viedma in 1782, that the river Chico rises in a lake. Was this that ancient lake, or did they refer to the little Lake Belgrano? It is impossible to say, but the waters of the lake—the bed of which is visible in the eastern sources of the river Mayer and in the southern source of the river Chico—have disappeared also in very recent times.

This depression is not so deep as those of Lakes Pueyrredon and Buenos Aires. The surface of Lake Volcán is at 780 metres (2559 feet), Lake Belgrano at 760 metres (2493 feet), Lake Azara at 720 metres (2362 feet), Lake Nansen (Plate CXXVII., Fig. 2) at 700 metres (2297 feet), and the bed of the disappeared lake to the east of the river Mayer at 600 metres (1969 feet), while Lake Burmeister is at 835 metres (2740 feet). These heights show that the eastern excavation is due principally to erosion, the confluence of the northern and

southern branches of the river Mayer being situated at 370 metres (1214 feet) above the sea level.

This depression is drained to the east not only by the river Belgrano, but also by the river Chico, and to the west by the river Mayer, *another undefined continental divide* being thus formed outside the Cordillera de los Andes. The panorama reproduced on Plate CXXVIII., Fig. 2, renders any further description needless. On the east and south rises the tableland—cretaceous and tertiary—crowned by vast streams of basaltic lavas, produced by numerous volcanoes, the craters of which have not yet been completely destroyed, and where several lakes of some importance exist, such as Lakes Quiroga, 1100 metres (3609 feet), Strobel, 715 metres (2346 feet), and Cardiel 270 metres (886 feet) in the south-eastern part.

All the ground between the tableland to the north of the river Belgrano and south of the river Chico belongs to the old hydrographic basin of the Chico which flows to the Atlantic, and contains a series of undulations made by the action of ice and erosion. There are here basins of dried up secondary lakes, lines of terraces showing their diverse levels, and the different outlets they once had, as their banks were gradually modified by the greater or lesser height of the waters. In their eastern part, the tertiary clays and sand layers, with volcanic deposits intermixed, extend horizontally. To the west, these layers rise or disappear, showing others older, folded and broken, probably cretaceous, which in their turn rest on folded lower cretaceous rocks.

At the southern end there flows the river Chico to the north-east, and another river—a southern tributary of the river Mayer—to the N.N.W., both rising near each other at the *point of contact of the tableland with the Pre-Cordillera*.

The Carbón river runs from the south across the foothills of the Pre-Cordillera, the highest peaks of which in the neighbourhood are Mount Hatcher and Mount Mayer, the glaciers of which feed the river. The river Mayer, a name taken by the river Carbón when forming a single channel, receives on the north the waters of Lakes Nansen, Azara, Belgrano and Volcán, and forms an acute angle first to the west and then to the S.S.E., flowing next through *the longitudinal depression to the west of the Pre-Cordillera* to the S.W. and S.S.W., until it enters the north-eastern branch of Lake San Martin, after passing through a small lake which in its turn also receives a river descending from the north and originating in another lake of about the same size. On the west there run, as has been stated, the eastern ridges of the Cordillera.

All this region drained by the river Mayer and its tributary lakes, is, according to the Chilian Expert, in Chilian territory and, therefore, to the west of the summit of the Cordillera, which he tries to make coincident with the continental divide; but Map X. and the accompanying figures and plates prove that this is not the case. No mountain ridge belonging to the Cordillera nor to the Pre-Cordillera rises to the east of Lakes Volcán and Belgrano, nor to the east of the river Mayer in the region of the continental divide. All efforts to show that the so-called continental divide is the main chain of the Cordillera de los



FLUVIO-GLACIAL DRIFT AT THE RIVER MAYER.

Andes, will upon a survey of the region utterly fail, and indeed that survey will tend to support the opposite opinion.

The accompanying plates give a good idea of the region claimed by Chile to the west of the plains. Plate CXXIX., Fig. 1, shows the edges of the tableland rising near the Pre-Cordillera as well as Las Vacas ridge in the eastern slope of that chain, to the north of the river Mayer, and Fig. 2 of the same Plate contains the mountains which belong to the Pre-Cordillera, to the south-west of the confluence of the rivers Nansen and Mayer.

The figure inserted herewith represents the fluvio-glacial drift, inclined to the

east, as it appeared before the capture of the lost lake by the stream wearing its way from the west, and now cut by the river Nansen. Plate CXXX., Fig. 1, shows



DEPRESSION BETWEEN THE CORDILLERA AND THE PRE-CORDILLERA THROUGH WHICH THE RIVER MAYER FLOWS INTO THE EASTERN ARM OF LAKE SAN MARTÍN.

the Cordillera to the west and north-west of the point where the river Mayer turns to the south to empty itself into Lake San Martín, by the general longitudinal depression which continually separates the Pre-Cordillera from the Cordillera de los Andes. Along the far off snowy ridges the Argentine line runs.

The Chilian Expert, in the absence of any geographical data to guide him in fixing his boundary line to the south of Mount Belgrano, has traced it along the extension between this mount and the centre of the tableland to the south of the river Mayer, where he imagines that the continental divide is produced, as he says in the Record of August 29, 1898 :—

“Points 327 to 329 separate the waters of the affluents of Lagoon Tar and Lake San Martín, which empty into the channels of the Pacific, from the affluents of the Argentine Lake Obstáculo.”

But Nature does not agree with the Chilian Expert's desires; in that section as in the north of Mount Belgrano, the continental divide does not occur in



*Las Vacas Ridge.*

*Western Edge of the Table-land.*

FIG. 1.



EASTERN PART OF THE PRE-CORDILLERA AND WESTERN PART OF THE TABLE-LAND AT THE UPPER VALLEY OF RIVER MAYER.

FIG. 2.



THE PRE-CORDILLERA FROM THE CONFLUENCE OF RIVERS MAYER AND NANSEN.



FIG. 1.



EASTERN RIDGE OF THE CORDILERA TO THE WEST OF RIVER MAYER.

FIG. 2.



THE LAVA TABLE-LAND BETWEEN RIVER CHICO AND LAKE SAN MARTIN.

[Face p. 984.



the Cordillera, but outside it. The most rapid glance at the Chilian map shows that the Chilian line to the south of No. 326, i.e. Mount Belgrano, passes through a district represented as a great blank and that it forms a curve which meets the course of a river marked as running into the Pacific, probably intended for the river Mayer.

It has already been stated that the Cordillera de los Andes does not exist where the Chilian Expert pretends, and that whilst the affluents of the river Mayer have at present their source in the basin of the river Chico, the river del Carbón, its frontal affluent, is seen running from the south. Tracing the Carbón river up towards its sources, it would be found to flow through a gap similar to those already mentioned to the north, between the tableland and the Pre-Cordillera, at a height of 1380 metres (4528 feet), where rises the river Caracoles, which flows into an eastern arm of Lake San Martín.

In the western depression the principal part of Lake San Martín lies, bounded to the east by extensive moraines, which filled up the former bed of the lake where Mount Lavalley formerly constituted an island. Lake San



THE OUTLET OF LAKE SAN MARTÍN, AT ITS COMMENCEMENT.

Martín opens out into several arms towards the south and west, and towards the north are two larger ones, the eastern being narrower than the western. The



eastern arm receives the waters of the river Mayer, and the western, prolonged towards the north, turns to the west, receives an important stream coming down from the north, and empties its waters into the north-western extremity of another small lake, where the common outlet exists, which forms an impassable torrent, with waterfalls, and which undoubtedly connects to the river Toro, flowing into the south-eastern arm of the Calen Inlet. Lake San Martín occupies the narrow longitudinal valleys between two of the ridges of the eastern slope of the Cordillera and Pre-Cordillera, and is fed by the melting of the large glaciers of the Cordillera. The Argentine line passes over the peaks which rise westward of the said glaciers, and, as already said, the range is impassable on that side, whilst the Chilean line, at its points 327 to 329, following the edge of the Patagonian plateau (327), seeks the sources of the affluents of Lakes Quiroga, Strobel and Cardiel, and from the Tar stream (328), passes between them and descends to the basin of the Tar, at a point (329) which is far from being "immovable," as ordered by the Treaties. In fact it is not possible to fix the point where the continental divortium aquarum permanently



THE OUTLET OF LAKE SAN MARTÍN, IN THE RIVER TORO,  
AND THE CORDILLERA TO THE WEST.

occurs, that is to say, the supposed "uninterrupted line of crests which divides the waters," to which the Chilean Expert refers, it being difficult to say whether

that water-parting at the present time is always produced to the west of the Tar lagoon, or to the east, as the Chilian Expert thinks.



SOUTH-WESTERN PART OF THE OUTLET OF LAKE  
SAN MARTÍN, FROM THE EAST.

At the spot where Señor Bertrand, during his journey in 1898, thought he met with a spur of the Cordillera de los Andes which "separates Chile from the Argentine Republic," there only exists an extensive field of lava which Dr. Moreno crossed some days after Señor Bertrand, on his way to the Carbón river. Plate CXXX., Fig. 2, represents the landscape in that tableland, where *not even the lowest* spurs of the Cordillera are to be seen. Koचाik Hill—which rises in it—is only an isolated protuberance, and its altitude does not reach the general level of the tableland; it is only an eruptive mass which has been subsequently worn by erosion and glacial action, as evidenced by the materials with which the valley is strewn, and is surrounded by pasture lands which were formerly morainic lagoons. Only the Tar lagoon continues as a remnant of the former extension of Lake San Martín, and between the lagoon and the lake are to be found embankments which show many channels of dry rivers where the continental divide must be sought. From Antonio de Viedma's account \*

\* See Angelis, *Colección de Obras y Documentos relativos á la Historia Antigua y Moderna de las Provincias del Río de la Plata*, Buenos Aires, 1837, vol. 6.

at the close of the last century, it may be inferred that the waters of Lake San Martín were still running to the east, since the Tehuelche Indians stated to him



RAPIDS OF THE RIVER TORO, OUTLET OF LAKE SAN MARTÍN.

that the Shehuen or Chalia stream proceeded from a lake. When Dr. Moreno visited this region in 1877 the waters of lagoon Tar were running to the west.



LAVA BEDS BETWEEN THE RIVER MAYER  
AND LAKE SAN MARTÍN.

The valley of the transversal depression commences at Lake San Martín, follows in a south-easterly direction and then changes to the east. It is afterwards reached by the river Shehuen or Chalia, which runs into it near another depression corresponding to Lake Viedma, and after their junction, the two extend as one to the Atlantic. In this depression there are still to be seen the channels of the former outlet of the lake in that direction, in which there

now runs but a small stream during the rainy season, and when the thawing of the snow on the tableland takes place. Half-way between the river Shehuen and the

lake is found the point where in summer the waters run to a lagoon, the lagoon Tar, and to the Shehuen river, but the Tar lagoon has no outlet at any season of the year.

While in the Record of August 29, 1898, it is stated by the Chilian Expert that landmark 329 is situated in the point of separation between the affluents of Lake Obstáculo, near Lake Cardiel, from those of Tar and San Martín, in the map presented by the Chilian Representative, this point is shown in the trans-



KOCHAIAK HILL.

versal depression of the old outlet of Lake San Martín to the Atlantic, a point standing only 154 metres (505 feet) above the sea-level, Lake Cardiel being found at 270 metres (886 feet) to the north-west, in a dale of the tableland, which between these two points has an altitude of 650 metres (2133 feet) above the level of the sea.

Plate CXXXI., Fig. 1, represents Lake San Martín to the east, showing its ancient eastern outlet; Fig. 2 of the same Plate gives an idea of the region to the west, before reaching the Cordillera and its eastern slopes; and the figures in the text show the point where the river Mayer empties itself into the lake in the depression separating the



THE ANCIENT OUTLET TO THE EAST OF  
LAKE SAN MARTÍN.



Pre-Cordillera from the Cordillera, the outlet of the same lake to the west, and its south-western part.



MOUNT FITZ-ROY (3370 m. ; 11,057 f.).

#### 6. THE BOUNDARY LINE FROM MOUNT FITZ-ROY TO MOUNT STOKES.

To the south of the transversal depression Lake San Martín-Shehuen the Chilian Expert's boundary line should pass by—

“Number 330, a stretch of Cordillera that separates the waters forming the Argentine stream Chalia from the slopes down which flow the tributaries of the Lake San Martín which empties into the channels of the Pacific.”

If the term “*Cordillera*” means broken tableland the Chilian Expert is right, but if it indicates Cordillera de los Andes he is *entirely wrong*, for that *stretch of Cordillera is only the broken tableland situated to the east of the Cordillera de los Andes*. In continuing the description of his line he adds :—

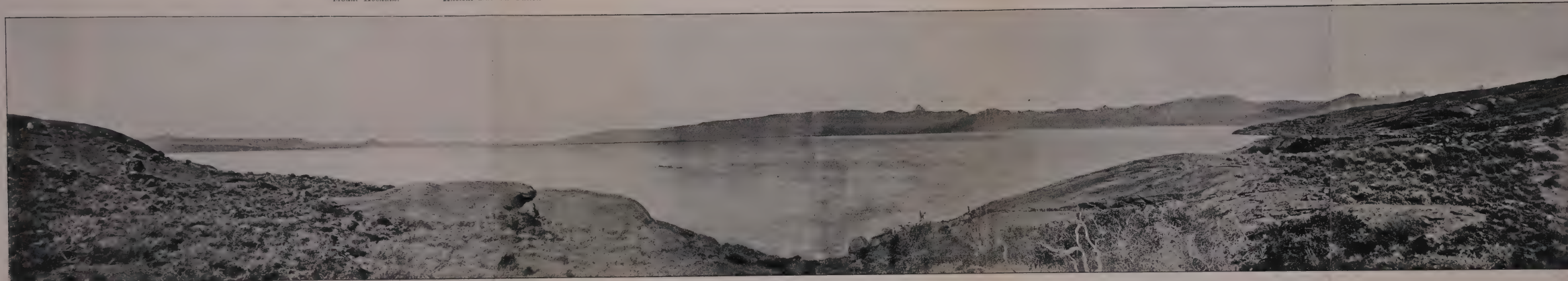


*Mount Kochaik.*

*Ancient Eastern Outlet.*

*Mount Pana.*

FIG. 1.

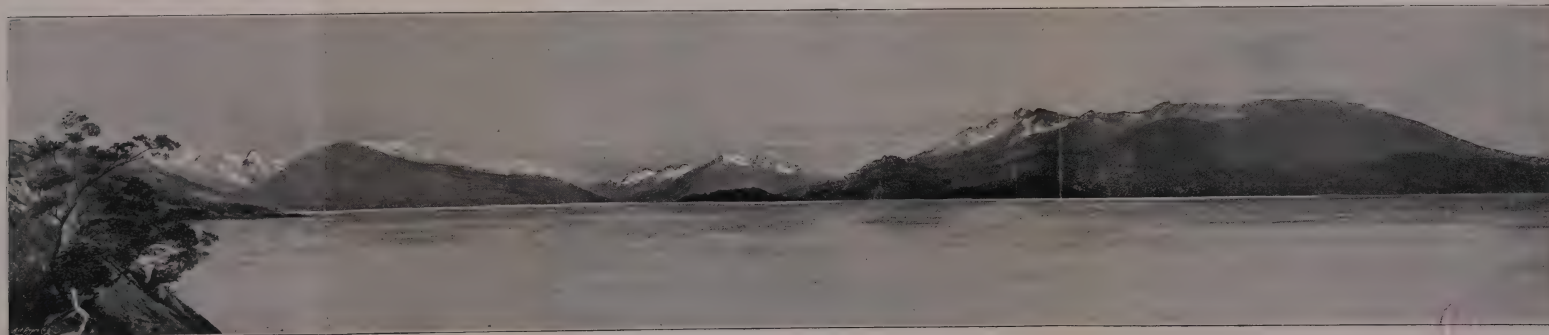


LAKE SAN MARTIN TO THE EAST, AND ITS ANCIENT OUTLET IN THAT DIRECTION.

*Cordillera de los Andes.*

*Pre-Cordillera.*

FIG. 2.



WESTERN PART OF LAKE SAN MARTIN.

[Face p. 939.]



"No. 331, Cordillera of Chalten, which separates the hydrographic basin of Lake Viedma, or Quicharre, that empties into the Atlantic through the river Santa Cruz, from the Chilian slopes that send their waters to the channels of the Pacific.\* No. 332, Cordillera of Stokes, which separates the hydrographic basin of Lake Argentino, which empties into the Atlantic through the river Santa Cruz, from the slopes down which flow the Chilian rivers which empty into the channels of Patagonia in the Pacific."

Between Mount Chalten or Fitz-Roy (the first name being seldom used, while the second is accepted in cartography) and Mount Stokes the two



MOUNT CAMPANA IN THE CORDILLERA TO THE WEST OF  
LAKE VIEDMA.

lines coincide. The Argentine line in this part of the frontier passes at the latitude of Mount Fitz-Roy (304) and continues over the mountains rising in the centre of the glaciers of Lake Viedma (305) and then by the elevated snow-capped crest of the Cordillera up to Mount Geikie, *mountains which are situated in the line of elevated crests or main range of the Cordillera de los Andes.*

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\* When descriptions of the Chilian Expert's line are quoted they are copied from the translations of the Records handed to the British Government by the Argentine Government.

Thus both lines apparently coincide over a long distance as far as the height of Mount Stokes. It is said "apparently," because it is possible that in the part of this section of the Cordillera covered with glaciers, like the St. Elías Alps of Alaska, sub-glacial rivers might be found carrying the waters of the eastern slope of the Cordillera to the channels of the Pacific, *for the glaciers reach to the level of the waters of the lake, and it is impossible to determine the sources of the streams that flow from them.*

The sources of the river Trinidad, discovered by the expedition of the Argentine despatch-boat 'Golondrina,' in 1898, are still unknown. However, it is not possible that difficulties can arise in the future in that part of the frontier,



EASTERN SPURS OF MOUNT AGASSIZ.

*for the Cordillera there is impassable.* Mount Stokes is not actually situated on the sharp edge of the Cordillera, but to the east of it, and it is not one of the highest peaks, as this part of the Cordillera contains greater elevations. Mount Campana measures 2570 metres (8432 feet), Mount Agassiz 3250 metres (10,663 feet), Mount Mayo, 2020 metres (6627 feet), Mount Heim, 2700 metres (8858 feet), and Mount Stokes measures 2160 metres (7087 feet), and from all its gorges there descend glaciers which feed Lakes Viedma and Argentino, and some which will be mentioned in the next chapter, while on the western slope others come down to Eyre Sound, St. Andrew's Sound and Peel Inlet, extending south to the Sarmiento Cordillera.

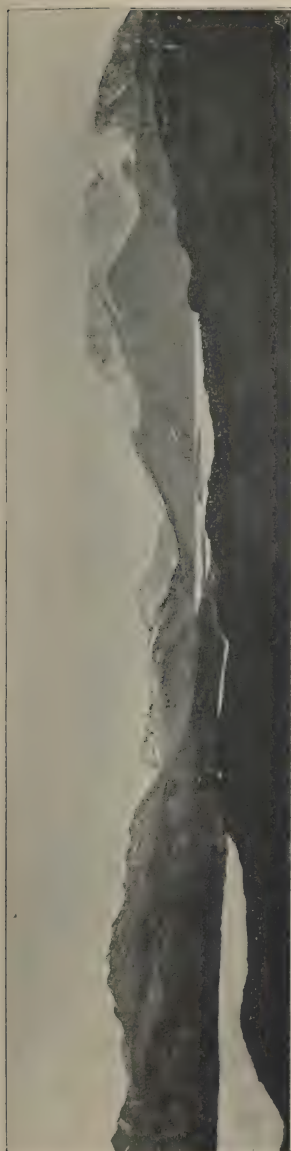


It must be borne in mind that points 304 and 305 of the Argentine line have been definitely accepted, according to the Record of October 1, 1898, as "forming part of the boundary line in the Cordillera de los Andes, between the Argentine Republic and the Republic of Chile," and therefore they have not been submitted to Arbitration.

#### 7. REMARKS ON THE ARGENTINE LINE.

The international frontier, proposed by the Argentine Expert, *may be considered as totally impassable* between Mount San Clemente and Las Heras river. On the western slope, immense fields of ice descend to the sea from the river Huemules to Calen Inlet, and in all the fjords of the coast their extremities are occupied by masses of ice which do not allow their interior to be reached. As will be seen further on, the frontier proposed by the Argentine Expert in the mass of the Cordillera, as far as its extreme southern point, possesses the same features, which are not only unfavourable to their gradual utilisation by man, but which also make the region the most inhospitable in western Patagonia. In the north the glaciers which on the west and east surround the base of the San Rafael glacier, descend from Mount San Valentín, and between this latter and the river Las Heras there may be seen several high summits which, if they do not surpass the San Valentín in height, are at least equal to it,

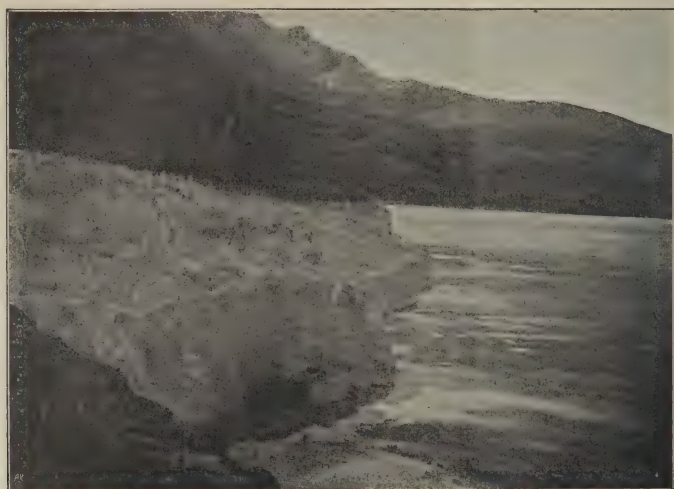
MOUNT HEIM (2450 m.; 8038 f.) FROM THE NORTHERN ARM OF LAKE ARGENTINO.





and among them is a volcano in eruption. Kelly Inlet, Benito Inlet, Julián Inlet, and Jesuit Inlet have in their gorges enormous fields of ice, and in the northern branch of the Calen Inlet, during the survey made of it by the Argentine Expert in 1897, an immense glacier was seen, descending from the north of the great Cordillera, the main chain of which is completely cut by the said inlet. In its southern coast glaciers also occur.

This inlet extends from the Pacific *for seventy miles to the east*, in two branches which communicate to the east, leaving between them the islands of Azopardo and Hércules. To the north of the latter, in the northern branch,



GLACIER OF LAKE VIEDMA.

hidden by a group of smaller islands, is situated the delta of the river Las Heras. This river, as before stated, drains lakes Lapparent, Buenos Aires, Soler, Pueyrredon, Posadas, Negro, Sorpresa, and Azul, which are situated to the *east* of the Cordillera de los Andes, *in its eastern slope, on the Pre-Cordillera, and in part on the Patagonian plain*. The Argentine Expert has chosen a point where navigation is impossible, and one which at the same time, can be readily distinguished, *to divert the boundary line from the high dividing summit* of the waters of the Cordillera to the lateral ridge, which deviation he considered necessary in fulfilment of the Protocol of 1893, since it has been stipulated that all the Pacific

coast is to be left to Chile. Had the boundary agreed in 1881 not been modified by the Protocol of 1893, several parts in the channels of the Pacific would have belonged to the Argentine Republic, as the sea here cuts through the Cordillera towards its eastern side.

The Argentine line cuts the Las Heras, so as to reach gap No. 302, situated in an eastern ridge dividing the waters flowing to Lakes Azara and Nansen, from those which flow down to the river Coligüe, which empties into Calen Inlet, thus leaving within Chilian territory the whole of the Calen Inlet and its banks. The line then follows along the eastern ridge of the Cordillera, until it reaches the outflow of Lake San Martín, which it cuts in the narrows and



GLACIER IN THE WEST ARM OF LAKE ARGENTINO.

rapids: it then continues along the crest separating the waters that fall into the said lake and those that fall to the fjords of western Patagonia, being prolonged along the summit of the Cordillera as far as the point where it is again intersected by the sea, near the extremity of the boundary line. *The frontier along the whole of this section is absolutely impassable, and therefore it is unnecessary to dwell upon it in detail.*

The Argentine line runs over the summit of that barrier of rock and ice, the natural boundary line *par excellence* between the two nations, just as it is wisely stipulated by the Treaty of 1881, while the Chilian line runs in the valleys, in the tableland outside the Cordillera, and passes over lands under the dominion

of the Argentine Republic which has inherited from Spain the region east of the Andean summit, a dominion recognised by the said Treaty, and corroborated by the Protocol of 1893.

Some Chilian geographers pretend that the Cordillera de los Andes loses its continuity to the south, but a proof to the contrary is contained in what has been stated in this Report, and in the maps which accompany it. From  $45^{\circ} 30'$  S. lat. to  $52^{\circ}$  S. lat. i.e., for a distance of 390 geographical miles, only once do the channels of the Pacific intersect the range, which is throughout the whole length quite impassable, and covered with ice and snow. The Cordillera referred to in the Treaties, exists always to the east of Chile and to the west of Argentina.

The two lines to the south of  $45^{\circ} 30'$  S. lat. have been described in general terms here, and are illustrated by Map X. *The justice of the natural line* proposed by the Argentine Expert, who has acted up to the spirit and letter of the Agreements in force between the Argentine Republic and Chile, has been shown: his line constitutes a genuine international boundary and natural defensive barrier between the two nations, while the Chilian line is inapplicable to the ground, in accordance with these Agreements, and is of no value whatever as a boundary line.





















